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Journal of the Minnesota State Medical Association, Southern Minnesota Medical Association, Northern Minnesota Medical Association, Minnesota Academy of Medicine, and Minneapolis Surgical Society

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VOL. XV JANUARY, 1932 No. 1

THE DIAGNOSIS AND TREATMENT OF MAJOR INFECTIONS OF THE HAND*

SUMNER L. KOCH, M.D.
Chicago

IN discussing the subject of infections of the hand it is scarcely necessary for me to remind this association of our indebtedness to Dr. Allen B. Kanavel. Our accurate knowledge of the diagnostic symptoms and of the proper method of treatment of infections of the hand is based upon the original experimental and clinical studies which he began to report in 1905.

There are three types of infections of the hand of so great importance and of such frequent occurrence that every medical man should possess the ability to recognize them promptly and treat them correctly. They are acute lymphangitis, infections of the flexor tendon sheaths, and infections of the fascial spaces of the palm.

Acute Lymphangitis.—An acute spreading infection of the lymphatics usually follows a trivial injury—a penetrating wound from a sliver, a pin, a surgical needle or tonsil snare, a scratch from a nail, or from a sharp splinter of wood or metal. Within a few hours of the injury the affected finger is hot and painful, and there is a more or less diffuse inflammatory reaction about the site of injury. Soon red streaks appear which extend up the forearm (Fig. 1). The patient feels restless and ill; his temperature rises; he has chilly sensations, and within twenty-four hours he may be acutely ill with repeated chills, high fever and prostration.

On examining the hand one finds the greatest reaction about the site of injury, but there is no evidence of pus formation; the symptoms are not confined to the distal phalanx, as in the case of a paronychia or felon; movement of the affected finger does not cause noticeable pain and does not exaggerate the symptoms present. Palpation of the elbow and axilla usually reveals tender and enlarged lymph glands even within twenty-four hours of the onset.

With such a clinical picture—a history of injury, local signs of inflammation, red streaks of lymphatic extension along the forearm and arm, and the early development of systemic symptoms of acute infection—there can be no doubt as to the presence of a virulent and rapidly spreading infection, usually of streptococcic origin. Nor is there any question as to the wisest method of treatment. The patient should be put to bed, the entire upper extremity enveloped in a warm, wet, sterile dressing and fluids given in the largest quantity possible. Surgical intervention in such cases causes a rapid extension of the infectious process with disastrous results. Unless one can secure localization of the infectious process by conservative measures he may be sure that active surgical intervention will only hasten an inevitably fatal outcome.

A typical instance of such an infection came to my attention recently. A physician, forty-eight years of age, sustained a slight abrasion of his right index finger. He paid no particular attention to it, and a few days later, on a Saturday afternoon, operated upon a patient with a Bartholinian abscess. The same evening he noticed that the finger was inflamed and painful. He felt restless and irritable, and finally went to his office and picked at the finger with a scalpel. All Saturday night the finger and hand throbbed and ached; he was restless and slept very little. Early Sunday morning he called a colleague, who infiltrated the finger thoroughly with procaine, incised it, and stated he was certain there was no pus there, for he cut down to the bone.

*From the department of surgery, Northwestern University Medical School. Read at the annual meeting of the Southern Minnesota Medical Association, Faribault, Minnesota, August 24, 1931.

When I saw the patient Monday evening he was obviously very ill. Perspiration was standing in beads on his face and neck; his temperature was 103°; he had had several severe chills.

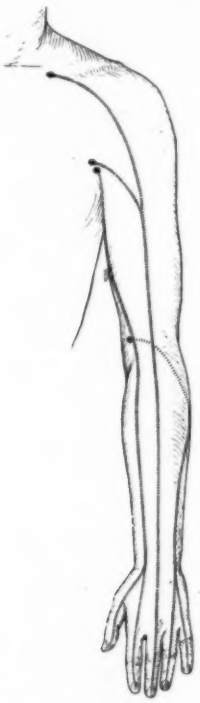

Fig. 1. Position of the main lymphatic trunks, and of the red lines of lymphatic extension in acute lymphangitis. (Kanavel and Mason, Sajous' Encyclopedia of Medicine.)

There was a thin serous discharge from an incision three-quarters of an inch in length on the palmar surface of the right index finger. Red streaks extended up the forearm and arm, converging toward the axilla. Fortunately no further surgery had been done and at the suggestion of a former student of Dr. Kanavel, who had seen the patient Monday morning, a massive, warm, wet dressing had been applied to the entire upper extremity throughout Monday. This treatment was continued; fluids were administered by mouth and by rectum, and the patient made a gradual and uneventful recovery without definite localization of the infection or abscess formation.

The outcome in the majority of cases is not so fortunate a one. Too often the patient's resistance is insufficient to overcome the virulent infection; surgical interference causes wider diffusion of the infection; septicemia and pyemia rapidly develop, and the patient dies.

Tendon Sheath Infections.—Tendon sheath infections usually result from direct inoculation or from extension of infection from the subcutaneous tissues. Their gravity lies in the fact that they spread with remarkable rapidity, and that destruction of the tendon sheath and of the tendon itself ensues in a very short time unless the infected area is drained, and prompt measures instituted to maintain the function of the tendons.

The tendon sheaths of the index, middle and ring fingers extend from a point just distal to the distal flexion crease of the finger to a line closely approximating the distal flexion crease of the palm (Fig. 2). They lie in close apposition to the palmar surface of the phalanges and are separated from the bone only by a thin layer of connective tissue. An infection of the flexor sheaths of any of these fingers makes itself evident very promptly by pain, swelling, inability to extend the fingers completely and by tenderness which corresponds definitely and accurately to the anatomical outlines of the tendon sheath.

The sheath of the long flexor of the thumb begins at a point slightly distal to the distal flexion crease of the thumb, and accompanies the flexor pollicis longus through the palm to terminate a thumb's breadth above the anterior annular ligament in an expansion known as the radial bursa (Fig. 2). Over the first metacarpal bone it lies between the flexor pollicis brevis and the adductor obliquus. The motor branch to the muscles of the thenar eminence lies superficial to the tendon sheath, approximately an inch above the annular ligament. The bursa ends in a blind pouch under the tendon and upon the pronator quadratus, separated by the latter from the wrist joint and the radio-ulnar joint.

The tendon sheath of the flexors of the little finger begins just distal to the distal flexion crease of the fifth finger and extends proximalward to become continuous, in the majority of cases, with the ulnar bursa, a good sized sac which lies over the metacarpal bone of the ring finger and the base of the middle metacarpal bone, and extends proximalward under the anterior annular ligament a thumb's breadth above the ligament (Fig. 2). Here it lies underneath the flexor tendons, upon the pronator quadratus muscle, and is separated by this muscle from the

wrist joint. In the region of the wrist joint the ulnar bursa forms a more or less complete sheath for the flexor tendons, being pushed radialward, as it were, in three pockets—one su-

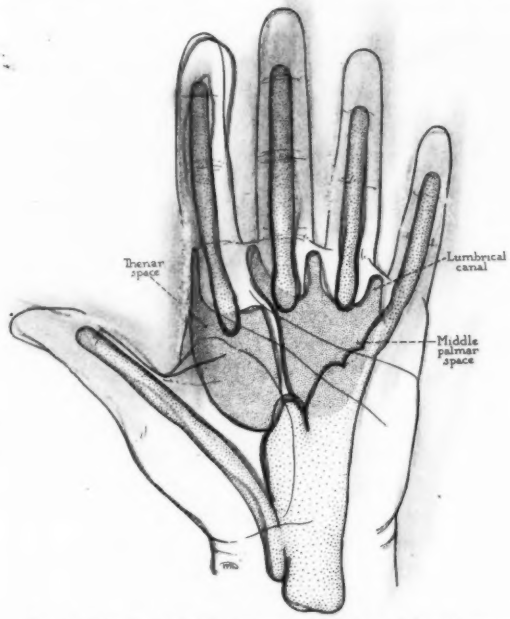

Fig. 2. Diagram showing the tendon sheaths and fascial spaces of the palm. (Kanavel and Mason, Sajous' Encyclopedia of Medicine.)

perficial to the tendons, one between the superficial and deep tendons and one, the largest and most easily distensible, underneath the deep tendons.

The exact arrangement of the tendon sheaths in the proximal portion of the palm and over the wrist is subject to considerable variation. The important fact from a practical standpoint is that in the majority of cases the radial and ulnar bursæ communicate with one another by way of an intermediary sheath, so that an infection of the tendon sheath of the thumb and radial bursa usually extends to the ulnar bursa and distally along the tendon sheath of the little finger. An infection arising in the tendon sheath of the fifth finger involves the same structures in the reverse order. From these various sites infection may extend to a number of different places, as will be indicated later.

The diagnosis of a tendon sheath infection is based on symptoms which early in the course of the infection are limited to the area involved, but which tend very quickly to become more difficult of interpretation because of extension of the infection to surrounding tissues. These symptoms are pain, tenderness and other signs of inflammation, frequently out of proportion to the

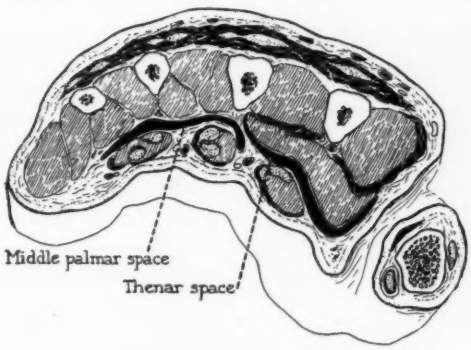

Fig. 3. Cross section of the palm above the metacarpophalangeal joints showing the position of the thenar and middle palmar spaces. (After Kanavel.)

extent of the infected area. The patient holds the affected finger in a slightly flexed position. Any attempt to extend it causes him to wince with pain. By gentle pressure an area of tenderness may be outlined which corresponds accurately to the anatomical outline of the tendon sheath. In every case the dorsum of the affected finger is swollen and edematous because of the direction of lymphatic drainage and the greater distensibility of the tissues of the dorsum of the hand as contrasted with those of the palmar surface.

If the infection involves only the index, middle or ring finger there is no doubt as to its location and the freedom of other fingers from infection. With infection of the radial and ulnar bursæ the inflamed swollen wrist, with the tense anterior annular ligament drawn like a taut cord across its volar surface, suggests at once the extension of the infection into the forearm. Since in more than eighty per cent of cases the radial bursa communicates with the ulnar bursa above the wrist it is common to find involvement of both bursæ. In early cases, however, it may be difficult to determine whether one is dealing with one of the less common types in which the bursæ do not communicate with one another. If, for example, the infection has begun in the thumb and spread into the radial bursa one wishes to be certain whether the ulnar bursa and the tendon sheath of the fifth finger are involved. In

such a case the position in which the fifth finger is held, the presence of pain on attempted extension of the finger, and the presence of a point of maximum tenderness where the distal flexion crease of the palm crosses the flexor tendons of the fifth finger (Kanavel's sign) are important considerations. If one is still in doubt it is wise through a bloodless field to make an exploratory incision in the palm over the sheath of the flexor tendons of the fifth finger. If no infection is present no harm will be done by such a procedure, but irreparable injury may be done if the infected sheath is not drained. If the primary infection involves the tendon sheath of the fifth finger, the same considerations apply with reference to the radial bursa and the flexor tendon sheath of the thumb.

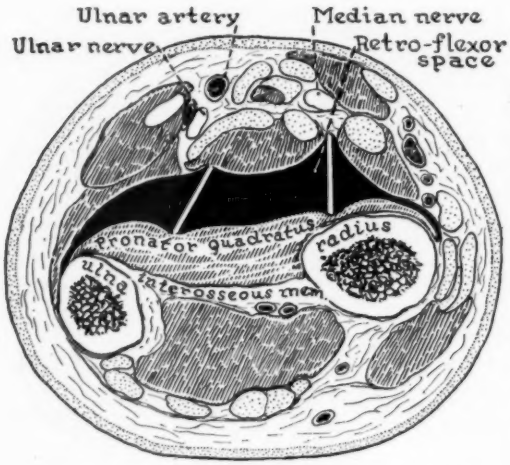

Fig. 4. The retroflexor space above the wrist into which pus ruptures from the radial and ulnar bursæ. (After Kanavel.)

In cases which have been neglected for four or five days, or which have been drained inadequately, the median and ulnar nerves may be so compressed by the pressure of the exudate above the wrist as to be partially anesthetized. In such cases the characteristic symptoms mentioned above—particularly the excruciating pain caused by attempted extension of the affected fingers—are masked, but the history, the location of the primary lesion, the bulging swelling above the wrist, and the general symptoms of severe infection make the diagnosis clear.

When rupture takes place from the tendon sheaths of the index, middle or ring fingers the pus spreads into one of the fascial spaces of the palm, and forms an abscess of the thenar space or the middle palmar space (Figs. 2, 3). (These will be discussed under infections of the fascial spaces.) When rupture takes place from the radial or ulnar bursa the pus at first lies in the retroflexor space between the flexor tendons and the pronator quadratus (Fig. 4). As it spreads upward it dissects between the superficial and deep flexor muscles and tends to become superficial along the ulnar side of the upper third of the forearm. In such an event the entire hand and forearm are dusky red, swollen, tense, and edematous. Vesicles or blebs may cover large areas of the affected extremity. Because of the extent of the involvement and the retention of a large amount of pus under pressure, toxic absorption proceeds at a rapid rate and the general symptoms of severe infection—high fever, rapid pulse, profuse perspiration, prostration, and not uncommonly delirium—indicate the extreme gravity of the condition.

Infection of the Fascial Spaces of the Palm.—These include the thenar space, the middle palmar space and the lumbrical canals which extend distalward from the thenar and middle palmar spaces along the lumbrical muscles. Infection of the fascial spaces of the palm may occur by direct inoculation and as the result of deep, penetrating wounds, but most commonly occurs as the result of extension of a tendon sheath infection.

The thenar space (Figs. 2, 3) lies upon the adductor muscles of the thumb partially covered by the short muscles of the thenar eminence, by the flexor tendons of the index finger and by the accompanying digital vessels and nerves (Figs. 2, 3). It extends ulnarward to the middle metacarpal bone. The middle palmar space lies deep in the palm upon the interosseous muscles, underneath the flexor tendons of the middle and ring fingers. On the radial side it extends to the middle metacarpal bone. On the ulnar side it is partially covered by the overlying distal end of the ulnar bursa.

Tendon sheath infections arising in the index finger tend to rupture into the thenar space. Tendon sheath infections arising in the middle and ring fingers usually rupture into the middle palmar space. In neglected cases tendon sheath infections starting in the thumb may rupture into the thenar space, and tendon sheath infections arising in the fifth finger into the middle palmar

space. With pus under great tension rupture from one space into the other may take place.

The symptoms of thenar space infection are pain, tenderness and swelling of the thenar eminence. Normally the thenar eminence is the most prominent portion of the palm, but with infection in the thenar space it stands out in such a pronounced fashion as to elevate the thenar eminence still more above the remainder of the palm and force the thumb away from the hand (Fig. 5). The dorsum of the web between the thumb and index finger is swollen and edematous. Eventually there is extension of the infection along the lumbrical canal on the radial side of the index finger, with tenderness and swelling on the dorsum of the hand between the index and middle fingers.

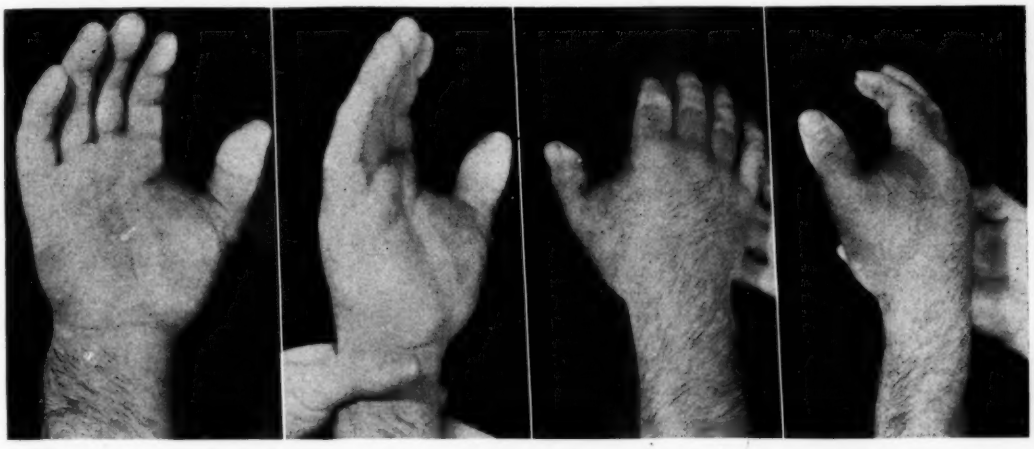

Fig. 5. Infection of thenar space, resulting in marked swelling of the thenar area and forced abduction of the thumb from the index finger.

With infection of the middle palmar space the striking symptoms are the loss of the normal concavity of the palm and the edema and swelling of the dorsum of the hand. Because the pus lies under the flexor tendons and the firm palmar fascia the palmar swelling is not pronounced, but it is sufficient to change the normal concavity of the palm into a slight convexity. Because of the direction of lymphatic drainage the dorsum of the hand is swollen and edematous, but pus will not be found on the dorsum except in those neglected cases in which the infection has extended distalward along the lumbrical canals and passed to the dorsum in the subcutaneous tissue about the web of the fingers. Only in grave, neglected infections in which osteomyelitis has taken place does pus find its way through the barrier of deep fascia, interosseous muscles, and metacarpal bones from the palm to the dorsum of the hand.

Treatment of Tendon Sheath and Fascial Space Infections.—The treatment of infections of the tendon sheaths and fascial spaces is to secure adequate drainage as soon as the condition is recognized. This should be done under a general anesthetic such as nitrous oxide, ethylene or ether, and through a bloodless field secured with the aid of a constrictor.

In draining the tendon sheaths of the fingers the incision should be made well to the side of the finger (Fig. 6), so as to avoid the digital nerves and blood vessels, the flexion creases on the palmar surface, and so as to prevent herniation of the tendon from its sheath, a complication that occurs very promptly if the sheath is opened through the middle of the palmar surface of the finger.

On incising a finger with infection of the tendon sheath one is always surprised by the extensive swelling of the subcutaneous tissues, and by the manner in which they seem to fill the entire wound and obstruct the deeper structures from view. Unless this edematous tissue is well retracted it is impossible to secure a clear view of or even to expose the deeply lying tendon sheath. If one can expose the sheath for a little distance before incising it with the scalpel he will find, instead of a thin translucent membrane

through which the shining tendon may be discerned, a grayish edematous structure which resembles the edematous peritoneum overlying an appendiceal abscess. The moment it is opened

Fig. 6. Incisions for drainage of the middle palmar space and of the tendon sheaths of the fingers and thumb. (Kanavel and Mason, Sajous' Encyclopedia of Medicine.)

the pus pours out. In very early cases the pus may not yet fill the sheath, and may appear only when the tendon is raised from the posterior surface of its sheath.

If the flexor sheaths of the thumb and little finger are involved the incisions must be extended upward (Fig. 6). One should avoid cutting through the muscles of the thenar eminence in the case of the thumb by making a curved incision to the ulnar side of the thenar eminence and retracting the thenar muscles radialward, and should remember that the flexor tendons of the little finger run obliquely upward and radialward and not in the line of the fifth metacarpal bone. Such an infection also requires an incision on the ulnar side of the forearm to drain the upper, most distensible portions of the ulnar and radial bursæ (Figs. 4, 6). It should always be made at the side, never over the middle of the volar surface, for the pus lies underneath the flexor tendons. A median incision in such a case inevitably leads to extensive fibrosis and destruction of tendons and frequently to operative or postoperative injury of the median nerve.

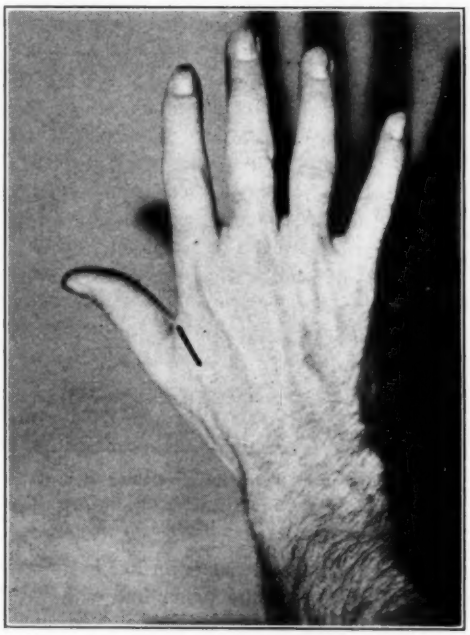

Fig. 7. Line of incision for drainage of thenar space.

The middle palmar space is drained through an incision between the middle and ring fingers, extending from just above the web of the fingers to the middle flexion crease of the palm. The flexor tendons, digital nerves, and blood vessels of the middle finger are retracted to the radial side and the corresponding structures of the ring finger to the ulnar side. The middle palmar space, as it lies behind the flexor tendons, is then widely exposed. Occasionally an additional incision over the lumbrical canal of the ring finger helps to make drainage more complete and hasten recovery. Through the incision indicated for drainage of the thenar space (Fig. 7) a pair of forceps or Kocher dissector is passed upward and ulnarward directly into the abscess cavity as it lies upon the adductor muscles of the thumb.

If drainage incisions are located correctly and of adequate length, an incision on one side of the affected fingers and on the ulnar side of the forearm, in the case of ulnar and radial bursæ infections, suffices for drainage. The use of

through-and-through drainage above or underneath a flexor tendon should be carefully avoided. It is the surest possible method of causing necrosis of the tendons.

With infections of the middle palmar and thenar spaces, drains should never be inserted through and through from the palm to the dorsum of the hand. The spaces in question are separated from the dorsal surface by a number of anatomical layers (Fig. 3). Plunging a pair of forceps through the deep volar fascia, the interosseous muscles, between metacarpal bones and through the dorsal aponeurotic and subcutaneous layers in order to drain an accumulation of pus in one of the fascial spaces of the palm renders almost certain the development of osteomyelitis and the formation of persistent sinuses.

After Treatment of Tendon Sheath and Fascial Space Infections.—In order to stop venous oozing after operations and to keep wound edges widely separated, drainage wounds are packed lightly with gauze impregnated with petrolatum. Occasionally rubber tissue is used instead. Tubes are never used because pressure necrosis of tendons and tendon sheaths and extensive fibrosis involving tendon and nerves inevitably result from their use.

In dressing the hand a large sterile towel is laid on the arm board, covered with abdominal pads and sterile dressings, and the outstretched arm is laid on the bed of dressings. More dressings are added to cover the arm; the dressings are saturated with a warm, sterile boric or salt solution and the edges of the towel brought together to enclose the whole. The warm solution is added at two-hour intervals without changing the dressing and a powerful electric light is suspended above the arm to help maintain the heat.

At the end of twenty-four hours the dressings are removed and a sterile dressing reapplied with the same care that was used in applying the original dressing. If one can avoid adding secondary infection, particularly to streptococcic infections of the tendon sheaths, the tendons may be saved and a complete restoration of function secured in a considerable proportion of cases.

The petrolatum gauze is removed at the first or second post-operative dressing. No drainage material is reinserted after removal of the original drains.

As soon as the acute symptoms have subsided, usually at the end of three or four days, an arm bath, used for fifteen or twenty minutes twice daily, is substituted for the continuous moist dressing. After being soaked in a warm, sterile solution the arm is laid on a sterile towel, allowed to dry for a half hour under an electric light and covered with a dry dressing. While the hand is in the bath the patient is urged to move his fingers gently to prevent the formation of fibrous adhesions. Simply moving the fingers through their complete range of motion once or twice daily during the period of forced immobilization suffices to prevent the formation of crippling adhesions. In addition to the dry dressing a light aluminum splint is applied to maintain the hand and the fingers in the position of function. As soon as the danger of lighting up the infection has passed, physical therapy and active exercises are begun so that restoration of function may keep pace with the healing of the tissues.

Summary.—The major infections of the hand —acute lymphangitis, infections of the tendon sheaths and infections of the fascial spaces of the palm, present definite and unmistakable diagnostic criteria.

Lymphatic infections should be treated conservatively and operated upon only when there are unequivocal signs of pus formation. Infections of the tendon sheaths and fascial spaces of the palm should be drained carefully and adequately as soon as the diagnosis is made.

In the post-operative care of hand infections the prevention of secondary infection, early mobilization and the maintenance of the hand in the position of function during the period of enforced immobilization are important details of treatment.

INTRA-ABDOMINAL LOCAL ANESTHESIA*

ROBERT P. CARON, M.D.
Minneapolis

THE purpose of this paper is to review some of the advantages, disadvantages and important technical points in the administration of intra-abdominal splanchnic anesthesia, together with the neuro-anatomy of the viscera. I am indebted to Doctor Robert Emmett Farr, with whom I was formerly associated, and to Doctor Stanley R. Maxeiner, with whom I am associated at the present time, for much of my subject matter.

INDICATIONS

There is nothing controversial in choice of anesthesia for the rugged, healthy individual, but in the chronically ill, in the aged, in cases of sepsis and in toxic states such as that due to late bowel obstruction, we believe that local anesthesia is the preferable method. Certainly, there is no one ideal anesthetic. It is not the purpose of this article to compare the limitations of spinal or the hazards of general anesthesia; each one of these forms of anesthesia is applicable to the individual case. Local anesthesia enables the surgeon to carry out his work with due deliberation and makes it unnecessary to sacrifice careful technic for speed. During the past year and one-half, we have induced over 85 spinal anesthesias and in some of the difficult cases, requiring longer procedures, the spinal anesthesia had waned before the completion of the operation, and at this stage we complemented the anesthetic by the establishment of intra-abdominal sympathetic anesthesia and infiltration of the abdominal wall with novocaine solution in order to reach our objective. In other words, a knowledge of the technic of intra-abdominal local anesthesia is an adjunct to the armamentarium of the surgeon relying on spinal anesthesia or mixed anesthesia, as recommended by Crile,[1] which depends for its efficacy on the completeness of the local anesthesia. The results obtained from the use of intra-abdominal local anesthesia are contingent upon the skill of inducing the anesthesia and also the ability to apply the special surgical technic which is necessary in order to operate successfully with this type of anesthesia. At the present time many surgeons with practically no training in the method consider themselves able to perform intra-abdominal operations under local anesthesia. They believe all there is to the method is to puddle the skin and fascia with novocaine, having no regard for anatomic landmarks, surgical strategy or the indication for splanchnic anesthesia. The chief difficulty encountered with intra-abdominal local anesthesia is the elimination of traction pain when the intra-abdominal organs are manipulated. The traction pain of normal organs is not great but it is increased when inflammatory processes are at work. Generally speaking, operations upon organs coming naturally in contact with the abdominal wall or those which can be readily brought up to it may most readily be performed, such as stomach and hernia operations. It is the establishment of anesthesia upon organs which normally lie deeper and require traction upon mesenteric attachments which we will dwell upon mostly.

DISADVANTAGES

The method cannot be used successfully in cases of sepsis where the operative field is infected. Intra-abdominal sympathetic anesthesia cannot be carried out satisfactorily in the presence of very large tumors and where inflammatory matting of viscera or organs is present. The exact state of the intra-abdominal organs cannot always be anticipated until the abdomen is opened. In operations involving acutely inflamed regions which are deep in the abdominal cavity and where there is secondary attachment of the diseased part to the posterior peritoneum with abscess formation, the blocking off of the sympathetics is technically a major procedure. In other instances, after the exposed organ to be worked upon has been manipulated and especially if the patient is not coöperative, an evisceration of bowel can readily take place even though the surrounding viscera has previously been packed away. It is this type of accident which very often discourages the use of the method. Local anesthesia cannot be used in cases of psychic incompatibility.

*Thesis read before the Minneapolis Surgical Society, May 21, 1931.

ANATOMICAL CONSIDERATIONS

Familiarity with the anatomy of the underlying structures and the general direction of the nerve supply of the abdominal wall is essential before one essays to adopt this method. Anatomically, operations on the abdomen are divided into two groups—those in which the operative objective involves only the abdominal wall, such as hernias, lipomas and tumors, and those in the second group, whose objective requires the opening of the abdominal cavity. It is this latter group which will be discussed.

SENSIBILITY OF THE ABDOMINAL WALL

The anterior abdominal wall including skin, fascia, muscles and parietal peritoneum receives its nerve supply from the 7th to the 12th intercostal and the ilioinguinal and iliohypogastric nerves. A few sensory fibers emanate from the parietal peritoneum through the round ligament of the liver and terminate in the region of the umbilicus. It must be remembered that this latter structure should be thoroughly infiltrated with the anesthetic solution, not only because of its sensory nerve supply but because of attachment to the posterior parietal peritoneum in the region of the liver, and traction of the abdominal wall in upper abdominal work causes indirect pulling of the sensitive posterior peritoneum. The thoracic nerves, after leaving the spinal canal, accompany the intercostal vessels and reach the anterior region of the abdomen by passing superficial to the transversalis muscle and give off branches which supply the skin, oblique and recti muscles. Other branches are given off which perforate the transversalis muscle and form a plexus superficial to the peritoneum. Thus, the abdominal wall receives branches from the lower six thoracic nerves and from the ilioinguinal and iliohypogastric nerves (Fig. 1).

THE SENSATION OF PAIN IN ABDOMINAL ORGANS DURING SURGICAL PROCEDURES

Lennander,[2] in 1901, was one of the pioneers to evolve a theory of abdominal sensations. His theories in their original forms are now considered obsolete; however, he deserves great credit for stimulating study of this problem.

Neumann,[3] in 1912, produced clear-cut experiments which are still tenable. These experiments were unknown to Kappis,[4] who independently came to similar conclusions at about the same time. Kappis' conception involves a consideration of the following facts:

"Sensory fibers leading from the lateral horns of the cord follow through rami communicantes

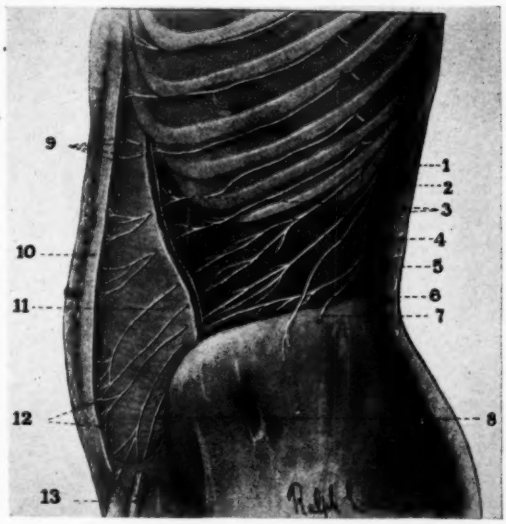

Fig. 1. Nerve supply of the abdominal wall. 1, costa XII; 2, N. intercostalis XII; 3, rami musculares; 4, M. transversus abdominis; 5, N. iliohypogastricus; 8, N. ilioinguinalis; 9, rami cutanei anteriores, N. intercostalis VIII; 10, sheath M. rectus abdominis; 11, M. obliquus internus abdominis; 12, rami cutanei anteriores, N. intercostalis XII; 13, funiculus spermaticus. (Photograph of illustration from Farr's "Practical Local Anesthesia.")

directly to the retroperitoneal ganglia. From here the fibers follow the blood vessels to the intra-abdominal organs. In the organs, the fibers are so fine that they are practically missing and no sensibility is present. Certain regions have sufficient sensory fibers present and caliber adequate to transmit sensation of pain by proper stimulus. These regions are mesentery, lesser omentum, region of cystic, hepatic and common duct, splenic and renal vascular areas and larger vessels."

The accepted proof of this theory is the clinical result of splanchnic block or the physiological response to stimuli such as inflammatory processes as manifested by reflex muscle spasm over the segment involved. It is, at the present time, generally accepted that viscera such as liver, spleen, stomach and intestines are insensitive to pain by manipulations such as cutting or burning. Traction or clamping may elicit a diffuse, vague abdominal sensation. Upper abdominal organs such as liver, gall bladder, stomach, duodenum

and spleen relay sensory impulses to the celiac plexus and from this plexus through the splanchnic nerves and rami communicantes to the dorsal cord. Vagus fibers do not transmit sensation of

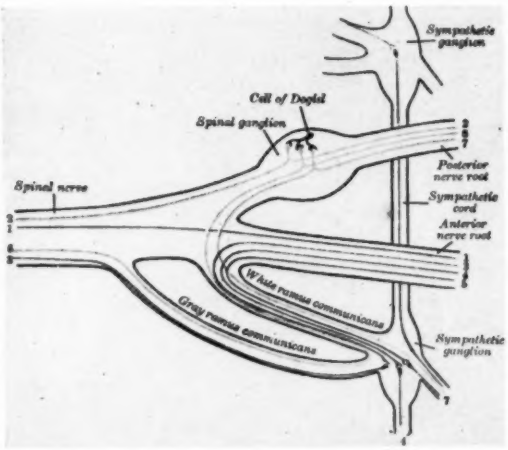

Fig. 2. Scheme showing structure of a typical spinal nerve. 1, Somatic efferent. 2, Somatic afferent. 3, 4, 5, Sympathetic efferent. 6, 7, Sympathetic afferent. (Gray's "Anatomy.")

pain but may transmit a sensation of nausea. From the transverse colon to the rectum, nerve stimuli are gathered at the superior and inferior mesenteric and hypogastric plexuses and join the cord through the lumbar rami communicantes (Fig. 2). It is believed that cutting or burning is not a physiological stimulus and that contraction, dilatation of the viscus or muscle spasm causing acute anemia of the organs are the factors that cause spontaneous pain.

NEURO-ANATOMY AND PHYSIOLOGY OF THE VISCERA

Previous to 1914, when Kappis first published his experiments on the splanchnic mechanism in animals, there was great controversy as to the distribution of the sensory nerve supply of the abdominal cavity and the organs contained in it. Since the brilliant work of Kappis, Neumann, Lennander, McKenzie, LeMaire, Langley and others, much information has been obtained concerning the neurophysiology of the abdominal organs. The general belief at the present time, as well summarized by Detakats,[5] illustrates the following anatomical considerations:

The great splanchnic nerve is formed by branches from the sixth to the ninth thoracic ganglia of the sympathetic trunk. It has the thickness of a match and runs on both sides of the vertebral column, passes through the crura of the diaphragm on the right side with the azygos and on the left with the hemiazygos vein and joins the celiac plexus at the level of the first and second lumbar vertebræ. The lesser splanchnic nerve originates from the tenth, eleventh and twelfth thoracic ganglia and runs parallel with the great splanchnic nerve and joins the celiac but mostly the renal and suprarenal plexuses. The two semilunar ganglia are situated above the pancreas at the level of the first lumbar vertebra; they are connected with each other by a thick network of nerve cords constituting the solar plexus from which are given off the superior gastric, phrenic, hepatic, suprarenal, renal, spermatic, ovarian, aortic and superior mesenteric, hypogastric and pelvic plexuses. This network of splanchnic fibers is situated in the loose retroperitoneal space between the vertebral column and the posterior parietal peritoneum. Fibers extend from these plexuses accompanying the blood vessels to their respective organs (Fig. 3).

The meeting place of the splanchnic nerves is at the 1st and 2nd lumbar interspace. This area can be reached from behind, called the posterior route, as advocated by Kappis, or from the front before the abdomen is opened, as advocated by Wendling,[6] or after the abdomen is opened by injecting the anesthetic solution into the retroperitoneal tissue, as introduced by Braun[7] and developed by Farr.[8] It is this method which we use in our intra-abdominal work.

Practically speaking, one may summarize in general that the peritoneum of the anterior and posterior abdominal walls, pelvis and diaphragm, the latter as far as supplied by spinal nerves, is sensitive to pain. The visceroperitoneum of the stomach, intestines, omentum, gallbladder, kidneys and liver is not painful. The fundus of the uterus is not painful to stimuli but the pedicle to the ovaries and tubes as well as the attachments of the uterus are sensitive to traction. From the work of Kappis, Lennander and others, we know that the splanchnic nerves follow the blood vessels in the mesentery. Finsterer[9] claims to have described a mesentery injection in 1912. Farr, about this time, began his anterior splanchnic anesthesia with injection of the branches of the splanchnic in the mesentery and in the posterior parietal peritoneum. He es-

tablished the fact that local infiltration of the abdominal wall in the line of incision could be accomplished so as to retain the anesthesia a sufficient time for ordinary laparotomy. By injecting a small amount of the anesthetic solution retroperitoneally and by surgical strategy, he has made local anesthesia of the various organs practical. With spring retractors for holding the abdominal wall well out of the field of operation, shifting the table to bring the organs worked upon into view, gentle handling of the viscera and lack of traction, he has excluded the use of general anesthesia in most abdominal surgery. The establishment of intra-abdominal anesthesia can be accomplished by injecting the solution into the mesentery, if the bowel is to be operated upon, and the supports of the adnexa in pelvic work, or by direct splanchnic anesthesia into the posterior parietal peritoneum in the region worked upon whenever this is possible.

IMPORTANT TECHNICAL POINTS

1. Again we must emphasize that familiarity with the anatomy of the underlying structures and the general direction of the nerve supply is essential.

2. Care should be taken to keep the needle point out of the large vessels and to keep the needle in motion as the injection is being made.

3. In the establishment of mesenteric or retroperitoneal anesthesia where the branches of the splanchnic are anesthetized, the important detail to consider involves the edematization of the tissues or, in other words, ballooning it by the use of only a few cubic centimeters of the solution, keeping the needle point in view, especially when the retroperitoneal structures are edematized so that the solution is not injected into large vessels.

PREOPERATIVE MANAGEMENT

Ordinarily the patient is given a preoperative sedative in order to allay apprehension: to-wit, morphin, one-sixth grain, and scopolamin, one two-hundredths grain two hours before the operation. If very apprehensive, the dose is repeated just before the operation is started. Of recent months we have been using a hypnotic of the barbituric series in the form of sodium amytal.

CHOICE OF SOLUTIONS

There are many drugs on the market at the present. During the past five years we have been using 1 per cent novocain with the addition of 3 minims of adrenalin to the ounce.

SKIN INFILTRATION

The technic of skin infiltration and abdominal

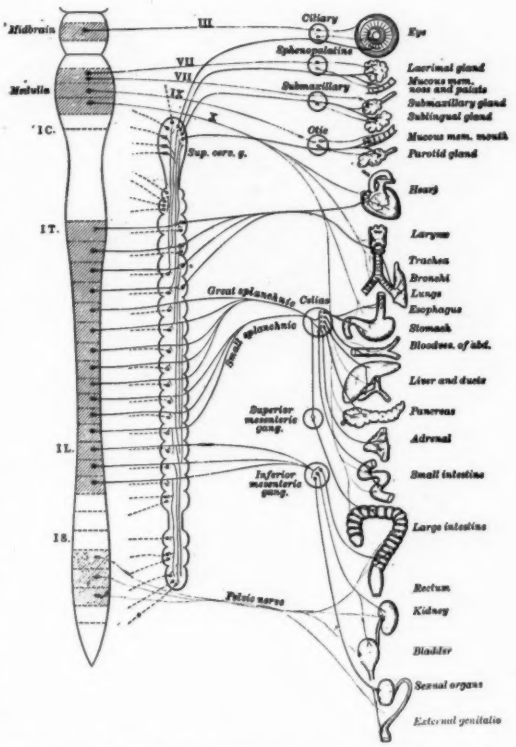

Fig. 3. Diagram of sympathetic nervous system. (Gray's "Anatomy." Modified after Meyer and Gottlieb.)

wall block will not be discussed as we are all familiar with its details without further review. But there is one point of importance which should again be mentioned. In upper abdominal work the round ligament of the liver should be anesthetized. There are many methods expounded for the establishment of abdominal wall anesthesia which are all satisfactory, including that of Labat,[10] which is a block anesthesia of the thoraco-abdominal nerves, or the establishment of anesthesia by injecting solution over the line of incision as advocated by Farr, or a paravertebral injection as advocated by Kappis and others.

INTRA-ABDOMINAL ANESTHESIA

In cases in which intra-abdominal anesthesia is desired, a particular surgical technic must be

adopted in order to painlessly manipulate organs. The strategy so often emphasized by Farr in order to eliminate traction and facilitate exposure is the keynote of success. The abdominal surgeon

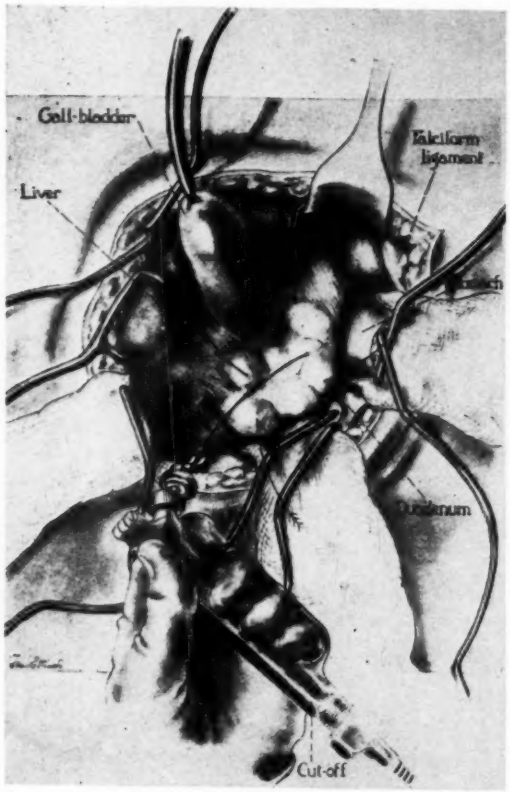

Fig. 4. Anterior splanchnic. Anesthesia technic. Surface view. Retroperitoneal injection under direct vision. Liver retracted upward, stomach and duodenum downward, giving exposure. Note anesthetic solution being introduced retroperitoneally under direct vision. (Photograph of illustration from Farr's "Practical Local Anesthesia.")

who successfully uses local anesthesia must be an opportunist.

Establishment of anesthesia within the abdominal cavity is predicated upon a complete anesthesia of the abdominal wall. After the abdomen has been opened, if there is evidence of positive pressure, the anesthesia of the abdominal wall can be reinforced by injecting the solution from within outward, infiltrating the peritoneum toward the sides of the incision. This latter reinforcement of abdominal wall anesthesia is especially applicable in cases where spinal anesthesia has waned, thus completing the operation without resorting to general anesthesia.

The next important step is upward retraction in all cases so as to facilitate visualization of the organ to be worked upon in order to decrease the possibility of positive pressure and to establish splanchnic anesthesia.

RETRACTION

Proper exposure is necessary before one can begin to manipulate intra-abdominal organs painlessly. This can be accomplished by a systematic and proper introduction of automatic retractors. Routinely after the incision of the skin has been made and fascia exposed, a pair of what we call No. 2 spring retractors are placed in the fat about 1 inch from each extremity of the wound. These retractors have a point on each end which grips into the subcutaneous fat. After the peritoneum has been exposed, a larger size of the same type of retractor is placed in the wound in a like manner, retracting the fascial layers. The peritoneum is next incised and its edges held apart by one pair of No. 4 retractors which have a non-pointed loop at each end. The abdominal wall is then slowly lifted in an upward direction by a hand retractor so that the underlying organs may be exposed. Viscera can be displaced out of the operative field by the use of sponges during this procedure. The usual error committed in the placing of packs is to attempt to squeeze sponges in place without first lifting the abdominal wall.

With proper lighting and proper exposure of the known mesenteric attachments, pedicles or posterior parietal peritoneum of the area to be worked upon, splanchnic anesthesia can be started. Intraperitoneal anesthesia for some of the most practical indications for local will be discussed in detail.

APPENDECTOMY

Wherever possible, the appendix is visualized and steadied with tissue forceps while 5 or 10 c.c. of novocaine is injected into the mesoappendix. If traction on the cecum is imperative, its peritoneal attachment is ballooned up with 5 or 10 c.c. of the solution in order to establish a cecal block. In cases where the appendix is not visualized immediately, gentle manipulation with the fingers can usually locate its whereabouts and with careful packing of the surrounding viscera with moist packs, in most cases either a portion of the appendix can be brought to view or at least the cecum can be isolated so that the solu-

tion can be injected either into the mesenteric attachment or mesoappendix. The same technic applies for a cecostomy or ileostomy.

Pelvic Operations.—The round ligaments should be injected first when possible and the important point to remember is that the outer lower ends next to the peritoneal attachment are the imporant locations to be edematized with the anesthetic solution. Many operators are oblivious to this detail and repeatedly inject the solution next to the uterus rather than out near the peritoneal attachment. The ovarian and tubal pedicles and broad ligaments are then infiltrated if traction is anticipated. And wherever possible, the posterior peritoneum over the promontory of the sacrum should be exposed and anterior splanchnic anesthesia of the sacral splanchnics should be done, preferably bilaterally just beside the promontory in order not to make a vascular injection. If abdominal hysterectomy is contemplated, the above anesthesia is complemented by subperitoneal infiltration about the uterine cervix. The region of the uterine arteries is especially sensitive and a small amount of solution should be deposited in the perivascular tissue just before clamps are applied. In blocking for a panhysterectomy, the same technic as for subtotal hysterectomy is employed except that the tissues between the bladder and cervix in front and the rectum and cervix behind must be thoroughly infiltrated.

The Ovary.—The normal ovary is not particularly sensitive. However, traction should be avoided and the ovarian pedicle injected but in case of large ovarian cysts or adherent cysts, it is often difficult to inject the pedicle. In such instances, the cyst may be evacuated before delivery is attempted and suction in the cyst applied immediately in order to obviate the dissemination of possible malignant particles. Once the cyst is reduced in size, the pedicle can easily be blocked.

Cesarean section, although very infrequently done under local anesthesia, can be accomplished by simple infiltration of the abdominal wall and the avoidance of delivery of the uterus. The uterine wall is not senstive.

Upper Abdominal Operations.—Operations on the stomach lend themselves particularly to local anesthesia because of the ease of access and unusually long mesentery, the exception being infiltrating ulcers in the region of the pylorus. There is no pain in suturing, burning or cutting of the stomach. In these cases, the round ligament of the liver is blocked before the incision is made. The splanchnic region is exposed by gentle

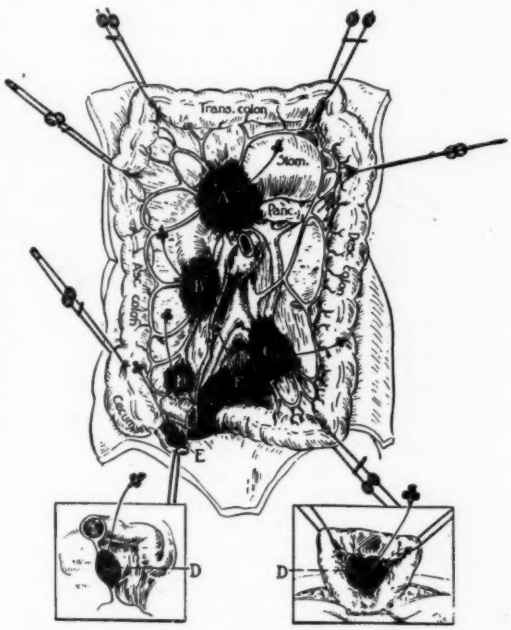

Fig. 5. The abdominal sympathetic system. Surface view. Colon eviscerated. Darkened areas show subperitoneal infiltration. A mesenteric anesthesia of transverse colon; B, mesenteric anesthesia of ascending colon; C, mesenteric anesthesia of descending colon; D, mesenteric anesthesia of small intestines; E, mesenteric anesthesia of appendix; F, anesthesia of pelvic sympathetics at pelvic brim. (Photograph of illustration from Farr's "Practical Local Anesthesia.")

upward traction of the liver edge and the pylorus gently drawn downward. About 10 to 15 c.c.'s of the solution is introduced beneath the peritoneum in order to block the underlying splanchnics which come through with the blood vessels. The gastrohepatic omentum is ballooned up with the solution before it is divided. The sides of the large vessels are also edematized in order to anesthetize the finer splanchnic branches. Usually, clamps are avoided in order to lessen the possibility of traction. Local anesthesia in stomach operations finds its chief value because of the lessening of the possibility of operative nausea. Operations such as resections, pylorectomies and gastroenterostomies can be performed by the above technic. Gastrostomy needs no intra-abdominal anesthesia.

Gallbladder Operations.—Gallbladder drainage can be done satisfactorily without intra-ab-

dominal anesthesia. When the gallbladder is to be drained for stones or the ducts scooped, sympathetic anesthesia is indicated and is accomplished by infiltrating the tissues around the cystic and common ducts with a few c.c. of the solution. If cholecystectomy is anticipated, the solution is injected beneath the peritoneal coat of the gallbladder close to the liver edge and the dissection usually started at the fundus. By the time the operation has proceeded to the region of the cystic or common duct, splanchnic anesthesia has had a chance to disseminate. Cholecystectomy is not difficult if there are no adhesions and not much inflammation. In such cases, one must be especially patient and infiltrate as the dissection proceeds from the fundus towards the ducts. As the dissection proceeds downward, one can sight the region of the cystic or common duct and introduce the solution into the retroperitoneal area in order to establish a splanchnic anesthesia. The usual mistake is to proceed with the dissection rather than waiting a few minutes to give the solution time to disseminate. If traction is necessary in high-lying livers and in obese individuals where splanchnic anesthesia cannot be established satisfactorily, it would be advisable to supplement local injection by inhalation anesthesia. However, with good exposure and attention to details and technic, this contingency is very rare (Fig. 4).

The Bowel.—Before traction is applied, the mesenteric attachment of the large bowel is infiltrated along the region of the large vessels especially, keeping the needle point in view while the mesentery is being edematized (Fig. 5).

Exploratory Operations.—In cases of malignancy where doubt of operability exists, an exploration under general is often an operation of magnitude on account of the depleted condition of the patient, while with local it is no more than an inconvenience. Therefore, local anesthesia is applicable especially to exclude or confirm a certain condition by the exploratory method. However, with satisfactory abdominal wall anesthesia and a small amount of inhalation anesthesia, a most complete exploration can be done as indicated.

SUMMARY

1. Local anesthesia for intra-abdominal operations is definitely applicable in cases where general or spinal is contraindicated, in cases of spinal anesthesia where the anesthesia has waned, and is the method of choice in major abdominal procedures in all cases of prolonged debility from disease, and in the aged.

2. Familiarity with the anatomy, and particularly the neuro-anatomy, of the field of operation is essential before one attempts to adopt this method.

3. Sympathetic anesthesia can be established by injecting the solution into the mesenteries, adnexal supports, subperitoneally and perivascularly.

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PRIMARY CARCINOMA OF THE BRONCHUS: REPORT OF SEVENTY-ONE CASES IN WHICH THE DIAGNOSIS WAS MADE BY BRONCHOSCOPIC EXAMINATION*

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MALIGNANT tumors in any part of the body are often associated with secondary growths in the lungs. This is particularly true if the malignant process originates in the breast, thyroid gland or kidney. Primary malignant growths in the lung, which usually arise in one of the larger bronchi, are much less commonly observed, and until the last decade were considered rare.

In the last five years, however, there has been a rather rapid increase in the number of such cases reported in the literature; the cases have been observed at postmortem and on clinical and bronchoscopic examination. Increasing use of the bronchoscope in the study of pulmonary disease has added much to knowledge of the early manifestation of primary bronchial malignant conditions, and accurate diagnosis and appropriate treatment have resulted.

I shall review here seventy-one cases of malignant disease of the lung observed from May, 1925, to January, 1931, in which diagnosis was made by the microscopic study of tissue removed from the lumen of the bronchus at bronchoscopic examination. It is hardly necessary to record that these patients were examined under local anesthesia with a minimal amount of discomfort, and that tissue was removed without any untoward results.

Fifty-seven of the patients were men and fourteen were women. Three patients were aged from twenty to twenty-nine years; eight from thirty to thirty-nine; nineteen from forty to forty-nine; twenty-four from fifty to fifty-nine; sixteen from sixty to sixty-nine, and one patient was aged seventy-two years.

It is manifestly impossible to determine the cause of malignant disease in the bronchus or to explain the evident increase in the incidence of the lesion. It is true that many of my patients had had prolonged respiratory symptoms that were probably the result of chronic bronchiectasis, and one might conclude that local irritation was a factor in the production of the lesion. Tuberculous disease of the lungs, which has been thought to be a causative factor in malignant disease of the bronchus, had been present previously in two cases only, and preceding respiratory disease, including influenza, had been noted in forty-seven cases. Less than half of the patients (thirty-two) were smokers, and only a few smoked to excess. Eight patients gave a family history of carcinoma.

The symptoms of carcinoma of the bronchus may simulate those associated with any pulmonary disease. In many instances symptoms had been present so long that a malignant lesion was not suspected until it was discovered through the bronchoscope. Even then, it could not be distinguished from inflammatory disease in the bronchus until tissue was studied under the microscope. The symptoms referable to the respiratory tract had been present for periods ranging from ten weeks to forty years. One would expect every patient suffering from a new growth in the bronchus to cough, and yet five patients did not cough. One patient had never had any pulmonary symptoms and had come for examination because of weakness, loss of weight and pain in the legs. Sixty of the patients had had sputum, frequently purulent in character, associated with the cough. Forty-three patients had expectorated sputum containing blood in varying amounts. Dyspnea was rather marked in certain cases and seemed to be out of proportion to the amount of lung obstructed by the growth; it was present in forty-nine of the seventy-one cases of this series.

Pain in the thorax was a most disturbing symptom, and was noted by forty-seven patients. Sixty-two patients had lost weight but two had actually gained weight during the course of the disease. Stridor was present even when the lesion was situated well beyond the bifurcation of the trachea; it was noted in twenty-three of the patients. Partial blocking of a bronchus invariably results, with suppuration, and symptoms and

*From the Division of Medicine, The Mayo Clinic, Rochester, Minnesota. Read before the Southern Minnesota Medical Association, Faribault, Minnesota, August 24, 1931.

signs produced by new growths in the bronchus are often thought to be caused by bronchiectasis or abscess. This was especially noticeable in my series of patients, as thirty-eight had had fever, ten had noted chills, five had clubbing of the fingers and thirty-one had leukocytes numbering more than 10,000. The hemoglobin of thirty-five patients was less than 70 per cent. Extension into the pleura with the development of pleural effusion is common in these cases, but in the cases of my series a diagnosis was made relatively early and the complication was observed in six cases only. In two of these the fluid was clear, in two it was blood-stained and in two pus was found in the pleural cavity.

Carcinomas arising in a bronchus usually produce obstruction to the lumen of the tube and limit the entrance of air into the lung beyond the stenosed area. Bronchostenosis was present in fifty-three cases and was the most frequently observed physical sign. Stenosis of the bronchus may be confused with thickening of the pleura or pleural effusion, but in the former the percussion note is not greatly impaired, whereas, in the latter, dulness or flatness is present.

Metastasis was definite in ten cases, and questionable in one case; it was usually observed in the cervical lymph nodes but was noted in the orbital cavity in two cases and in bones in three. The recurrent laryngeal nerve was involved, with resulting paralysis of the vocal cord, in four cases. Although malignant disease metastasizing to the lungs from other organs rarely produces the signs and symptoms of primary malignant disease in the bronchus, one must always consider the lesion in the bronchus to be secondary to an extrapulmonary growth.

One patient had had a hypernephroma removed eight years previously, one had had carcinoma of the bladder two years before the onset of the pulmonary lesion, and a third patient had had carcinoma of the uterus two years before the bronchial growth appeared. None of the tissue removed from the bronchial lesion resembled that of the original growth.

Roentgenographic examination of the thorax revealed evidence of a lesion in the lung in sixty-nine cases; in the other two cases the examination was considered negative. In thirty-two cases the lesion observed was thought to be inflammatory, and in one case the shadow in the roentgenogram was thought to be due to benign tumor. In thirty-six cases a roentgen diagnosis was made of primary malignant disease in the bronchus; the diagnosis was based on infiltration near the hilum of the lung extending toward the periphery as a fan-shaped lesion that is usually associated with partial pulmonary atelectasis.

Although bronchoscopy offers the most accurate method of early diagnosis of malignant disease of the bronchus, I have not been able to obtain positive evidence in about a third of the cases suspected of being malignant, because the lesion was in an inaccessible portion of the bronchial tree, or the infiltration was not associated with ulceration and a satisfactory piece of tissue could not be obtained. In many cases, negative bronchoscopic data can be explained by an erroneous clinical diagnosis. One should not hesitate to remove tissue from an infiltrating lesion in the bronchus if a malignant process is suspected, for in many instances the lesion cannot be distinguished from inflammatory disease without microscopic study of a portion of the growth.

In seventy of the cases, the diagnosis of malignant disease of the bronchus was made at the first bronchoscopic examination. In the remaining case, the patient was rather intolerant to the examination and the lesion in the bronchus to the lower lobe of the left lung was not detected until several months later, when another bronchoscopic examination was made.

In a considerable number of cases the clinical history and the general and roentgenographic data suggested the presence of bronchial malignancy, and at bronchoscopy the gross picture was similar to malignant infiltration, but tissue removed from the lesion was inflammatory, and subsequent developments have proved that the character of the disease was benign. This condition has been noted especially in cases of unsuspected foreign body of intrapulmonary or extrapulmonary origin. In certain cases in which tuberculosis involved the base of a lung the condition simulated malignant disease of the bronchus, but usually there was absence of bronchial ulceration, although in a few cases the differential diagnosis could not be made until tissue removed from the bronchus had been examined microscopically. On bronchoscopic examination, the growth can be located exactly. On the right side, the lesions were in the bronchus to the lower lobe in twenty-three cases, in the main bronchus in twenty-one and in the middle and upper

lobes in two each. On the left side, the lesions were in the main bronchus in twelve cases, in the bronchus to the lower lobe in seven and in the bronchus to the upper lobe in three. In one case there was diffuse carcinomatous infiltration of the trachea and bronchi, and in another the lesion was in the trachea alone. Tissue removed from the bronchus was examined and graded according to the method of Broders. In forty cases the lesion was squamous-cell epithelioma; twenty-seven of these lesions were graded 4, twelve were graded 3 and one lesion was graded 2. In twenty-six cases the lesion was adenocarcinoma; eleven were graded 4, twelve were graded 3, one lesion was graded 2 and two lesions were graded 1. Carcinoma was graded 4 in two cases and 3 in one case. In one case the lesion was regarded as lymphosarcoma and another was not graded because a sufficient amount of tissue was not obtained for examination.

Although the prognosis in primary malignant disease of the bronchus is regarded as hopeless, one should always advise the use of radium or deep roentgen rays, except in cases in which the general condition of the patient does not permit any type of treatment. Forty-two of the patients in this series were treated with radium or roentgen rays, and as practically all were advised to have treatment, it is possible that others were treated after returning to their homes.

Ten patients were living and considered their condition much improved or cured for an average of fifteen months after a diagnosis was made at the clinic. All of these had had radium or roentgen-ray exposures, or both. Seven were failing after an average duration of life of seven months following a diagnosis, and two of these had been treated. Fifty-four patients died after an average life of six and a half months; thirty of these had been treated. Although the results of treatment could not be classified as brilliant, the fact that the condition of ten patients is improved or cured after radium or roentgen-ray exposure, one patient for four years, justifies the employment of such treatment whenever possible. At present, the operative treatment of malignant growth of the bronchus is hardly justifiable.

CONCLUSIONS

1. Primary malignant disease of the bronchus is not rare.

2. Any infiltration at the hilum or base of the lung may be the result of malignant disease.

3. Pulmonary symptoms are usually present, but in some cases they may be mild or absent.

4. Bronchostenosis is the most frequently observed physical sign of the disease.

5. Patients suffering from malignant growths in the bronchus have had pulmonary symptoms for many years, and it is possible that prolonged pulmonary suppuration may predispose to the development of carcinoma.

6. Bronchoscopy offers the only means of making a relatively early and accurate diagnosis of the presence of a malignant lesion of the bronchus, and is usually indicated in chronic pulmonary disease if tuberculosis is an unlikely etiologic factor.

7. Radium and roentgen-ray treatment has been followed by beneficial results and should be employed unless contraindicated by extensive metastasis or extreme weakness.

REVIEW OF NON-TUBERCULOUS CASES ORIGINALLY DIAGNOSED PULMONARY TUBERCULOSIS*

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A STUDY of adult patients sent to this Sanatorium with a diagnosis of pulmonary tuberculosis and subsequently found to be non-tuberculous was made. All patients, with a few exceptions, who are admitted, enter with a diagnosis of some form of tuberculosis. During the past five years 2,429 patients have been admitted and 2,096, or 86 per cent, had pulmonary tuberculosis. This brief study was undertaken primarily to obtain a statistical picture of the incidence and types of non-tuberculous patients encountered; and secondarily, to offer a few remarks on the problems of differential diagnosis which this review might bring to light.

About 12 per cent of pulmonary cases receive a so-called "deferred" diagnosis on admission. By this is meant that there is insufficient evidence at the time to warrant a diagnosis of tuberculosis, and implies that further study and observation will be necessary. Many of these individuals with a clinical history suggestive of tuberculosis, but with few objective findings, require several months of observation before a non-tuberculous diagnosis is justified.

In classifying these cases we use the scheme adopted by the National Sanatorium Association.[1] Diagnostic standards given for non-tuberculous cases are as follows:

1. No persistent râles in the upper half of the chest.
2. X-ray negative or showing a slight peritruncal lesion.
3. Tubercle bacilli never found in sputum.
4. Complement fixation test for tuberculosis, positive or negative.
5. No constitutional or focal reaction to the subcutaneous tuberculin test after the injection of 10.0 Mg. of Old Tuberculin once repeated. (Scale of doses—0.0001; 0.001; 0.003; 0.005; 0.01; 0.01.)
6. Constitutional reaction to the subcutaneous tuberculin test of 10 Mg. or upon repetition without focal reaction as determined by physical signs (râles) or X-rays.
7. No history of unexplained hemoptysis of a teaspoonful or more.
8. No history of unexplained pleurisy with effusion.

The group which is designated as "suspected tuberculosis" follows the above classification except that either No. 7 or 8 may be positive but not both. ("Suspects" were not classified separately, but were included under the deferred diagnosis group.)

A third group which we should at least mention are the "non-clinical" cases. They conform to the classification given for non-tuberculous cases with one exception, viz.: No. 2 reads "Parenchymal X-ray lesion not explainable by other causes." Serial chest films are of especial value here in determining whether active tuberculosis exists. Patients with non-clinical tuberculosis frequently come in with symptoms which have been falsely explained by the X-ray film. Sixty-nine cases of non-clinical tuberculosis have been sent in during the past five years, many of them with minor non-tuberculous complications which accounted for their symptoms.

TABLE I

CASES ADMITTED WITH DIAGNOSIS OF PULMONARY TUBERCULOSIS

1925-1929

Diagnosis	No.	Per cent
Pulmonary tuberculosis	1943	92.7
Non-clinical tuberculosis	69	3.3
Non-tuberculous	74	3.6
Indeterminate	10	.4
Total	2096	100.0

In Table I we see that 74, or 3.6 per cent, of the patients sent to the Sanatorium were found to be non-tuberculous. The percentage given for similar cases by other sanatoria agree closely with this figure. Various authors, among them Rist and Hamilton,[2] have felt that sanatoria often unwittingly harbor many cases not suffering from tuberculosis. This, however, is not true at present, with the improved diagnostic aids coupled with the rigid diagnostic standards

*From the Glen Lake Sanatorium, Oak Terrace, Minnesota. Read before the Monthly Staff Meeting of Glen Lake Sanatorium, May 19, 1930.

TABLE II

COMPARISON OF ADMISSION AND DISCHARGE DIAGNOSIS MADE AT SANATORIUM

Non-Clinical Cases		No.	Per cent	Non-Tuberculous Cases		No.	Per cent
Adm. Diag.	Pulmonary Tb.	26	38	Adm. Diag.	Pulmonary Tb.	6	8
	Non-clinical Tb.	10	15		Non-clinical	6	8
	Deferred	33	47		Non-tuberculous	2	4
					Deferred	60	80
Disch. Diag.	Non-clinical	69	100	Disch. Diag.	Non-tuberculous	74	100

exacted before diagnosis is made. The indeterminate group includes patients who deserted or were transferred to other institutions before studies were completed.

Table II gives a comparison between the admission diagnosis made here and the final diagnosis. It shows what changes the diagnoses went through and intimates that a quick diagnosis was not easy, it being necessary to defer judgment on most of these patients on admission. Many of them required three months or more of study before an opinion could be given with reasonable certainty.

In diagnosing tuberculosis, Pottinger[3] states that, "the first and most important point in the diagnosis of phthisis is to know when to suspect it." Once we suspect it, diagnosis is usually not so difficult, especially with the aid of the characteristic changes seen on the roentgenogram. The routine use of chest roentgenograms in general physical examination cannot be too strongly recommended. There is, however, a group of patients in whom little evidence can be found to support a diagnosis of phthisis from a clinical or roentgenological standpoint, yet for want of a better diagnosis these individuals are often "threatened with tuberculosis." It is this group which have long offered a real diagnostic problem and which make up the bulk of non-tuberculous cases sent to us. Such patients may have lost some weight, may have a slight temperature and so on the basis of such symptoms, plus a positive skin test, he or she is often branded as tuberculous.

In regard to these obscure cases we may paraphrase Pottinger's remark and say that here the important point is to know when to allow clinical evidence to divert our minds away from tuberculosis. It is in these patients that a thorough search should be made for the presence of some chronic or acute non-tuberculous lung infection or extra-pulmonary pathology which would explain the patient's symptoms. Failing in this, tuberculosis then may have to be re-considered; and finally it is quite possible that the patient may have no organic disorder whatever.

While one should never lose sight of the possibility of tuberculosis, it is a serious mistake to wrongly diagnose an individual as tuberculous. That it may handicap the patient both socially and physically cannot be denied. We all know that there are still people who have an exaggerated fear of anyone who has been branded as a "consumptive." And also, the possibility of making a "neuro" out of a certain number of these people exists. There are some who enjoy poor health and are able to adjust themselves nicely to fit such a diagnosis. There are others who become confirmed hypochondriacs, because of their supposed tuberculosis.

TABLE III

NON-TUBERCULOUS GROUPS

Classification	No.	Per cent
1. Apparently normal	23	28
2. Misc. extra-pulmonary conditions	29	41
3. Pulmonary disease	22	31
	74	100

We divided the non-tuberculous series into three groups as may be seen in Table III. The first group we found a bit hard to classify and we may be criticized for terming them "apparently normal." Probably some of these individuals should have received a diagnosis of nervous exhaustion or instability. Many of them gave a history of having an upper respiratory infection but usually little or no tangible evidence of respiratory disease was found. Their symp-

toms were much the same. They gave a history of tiring easily, general malaise, slight loss of weight and probably a dry cough; some also complained of chest pains and a slight temperature rise. In none of these individuals were any one of Brown's diagnostic points[4] fulfilled.

We do not overlook the fact that many such patients have tuberculous infection and may develop tuberculous disease later in life. Such patients, especially in the teen-age group, we should warn as to the future; but we are not justified in making a diagnosis of tuberculous disease with the evidence at hand. The majority of these individuals, many of them of the nervous, high-strung type, were found to have been living outside of their physical income and were simply tired and in a so-called run-down physical condition. They usually responded to a short period of physical and mental relaxation and later to sensible living habits.

The above condition has been described by various writers as an entity, it being termed occult tuberculosis, the tired sickness, concealed tuberculosis, etc. Some authors[5, 6] have attempted to classify these individuals as tuberculous on the basis of vague symptoms plus a constitutional or local reaction following the use of tuberculin. Making a diagnosis of tuberculous disease on such meager evidence is seldom if ever warranted.[7] Masked tuberculosis such as Norris and Landis[8] describe no doubt exists but making such a fine diagnosis with our present diagnostic aids is rather precarious. (We have had no experience with the diagnosis of pre-clinical tubercle in suspects by the Caulfield Inhibitive and T.C.F. reactions as advocated by Odgen.[9]) These individuals require painstaking and frequent examinations and prolonged observation before an opinion can be given. And then it must be admitted that a certain number of these under-par individuals resist diagnosis in spite of employing all of our diagnostic weapons. This latter class are most annoying but usually survive their physicians.

We next consider the extra-pulmonary group. Among them we find conditions which give a clinical picture of nervous and physical exhaustion, as does tuberculosis. Some of them which may simulate an early tuberculous process are: heart disease, intestinal disorders, syphilis,[10] hyperthyroidism, neurasthenia, and mouth and upper respiratory infections. Among the latter chronic latent sinusitis[11] especially deserves mention.

TABLE IV

MISCELLANEOUS EXTRA PULMONARY CONDITIONS

Diagnosis	No.	Per cent
Heart disease	8	27
Intestinal disorders	5	17
Syphilis	4	14
Upper respiratory infections	4	14
Carcinoma (esophagus) (larynx)	2	7
Arthritis	2	7
Hodgkin's	1	3.5
Hyperthyroidism	1	3.5
Actinomycosis (rib)	1	3.5
Pregnancy	1	3.5
Total	29	100

Heart disease predominated in this group with intestinal disorders ranking second (Table IV). Both functional and organic conditions were included in the latter. There were two instances of gastric ulcer. In many of these patients the underlying pathological process had given rise to few localizing symptoms so attention was not directed to it.

TABLE V

NON-TUBERCULOUS PULMONARY INFECTIONS

Diagnosis	No.	Per cent
Bronchiectasis	11	50
Bronchitis	5	23
Pulmonary abscess	2	9
Asthma	1	4.5
Empyema (non-tbc.)	1	4.5
Blastomycosis	1	4.5
Pulmonary fibrosis	1	4.5
Total	22	100.

The third and last group includes the pulmonary infections of non-tuberculous origin. Bronchiectasis was by far the most frequently encountered, with bronchitis and pulmonary abscess next in order (Table V). Bronchiectasis is frequently misdiagnosed as tuberculosis or chronic bronchitis. According to Ochsner[12] the majority of so-called bronchitis patients really have bronchiectasis. It is interesting to note that there are no cases of pulmonary malignancy in this group; in fact we have had only one case of primary pulmonary malignancy on record in a total of approximately 4,400 admissions.

In recent years suppurative pneumonitis, lung abscess and bronchiectasis have been less frequently confused with tuberculosis. Alexander[13] states that this increasing accuracy in the diagnosis of these lesions is due to "the use of iodized oil pneumograms and bronchoscopy together

with a better appreciation of the etiologic factors and the tremendous value of the patient's medical history."

The value of bronchograms or pneumograms deserves special emphasis. Frequently we have patients with many clinical signs of phthisis including a productive cough but no X-ray evidence on the ordinary chest plate. In these bronchography often reveals an early bronchiectasis.

The value of a complete sputum study should also be stressed. A bacteriological examination of the sputum too often ends when no tubercle bacilli are found. It should go farther. The sputum of bronchiectasis, lung abscess, the bronchomycoses,[15] fuso-spirochetal disease,[16] asthma, etc., all tell their own story and frequently bring to light the true diagnosis.

The incidence of upper respiratory disease among the non-tuberculous lung infections is not dealt with in this paper. Suffice it to say that infections of nasal accessory sinuses were almost invariably found and appeared to be a predisposing factor in many cases, as Dunham[14] and others have pointed out.

TABLE VI

TABULATION OF LEADING SYMPTOMS GIVEN BY ALL NON-TUBERCULOUS GROUPS

Symptom	No.
Tiredness or weakness	22
Dry cough	20
Productive cough	13
Slight temperature	14
Chest pains	10
Bloody sputum	9
X-ray evidence of tb	9
Loss of weight	8
Night sweats	6
Frequent colds	3
Bronchitis	3
Positive tuberculin test	2

A tabulation of the symptoms or findings which apparently prompted sending these patients to the sanatorium was made from the admission history. In most cases two symptoms were chosen, and in some instances only one was considered necessary to record, *e.g.*, X-ray changes supposedly tuberculous in origin. It is apparent from Table VI that a history suggestive of respiratory disease was obtained in most cases, yet in only one-third of the series was any lung or upper respiratory disease found.

COMMENT

The number of non-tuberculous patients sent to this sanatorium has been low. About two-thirds of them showed some sign of disease. A number of patients apparently were diagnosed tuberculosis merely on a "hunch" gained chiefly from the under-par appearance of the patient coupled with the absence of any demonstrable extra-pulmonary disease. While it is probably better to err on the safe side, yet a diagnosis in the absence of positive findings is seldom, if ever, justified.

Where and how to study these borderline cases is largely an individual problem, which in turn is dependent on available facilities for observation. Institutional care and study would be ideal in most cases, but this is impracticable, and so it usually devolves upon the general practitioner to render the important verdict: tuberculous or non-tuberculous.

SUMMARY

1. Among 2,096 consecutive cases sent to Glen Lake Sanatorium for pulmonary tuberculosis 74, or 3.6 per cent, were found to be non-tuberculous.

2. Classification of non-tuberculous patients:
   a. Twenty-eight per cent were classed as apparently normal.
   b. Forty-one per cent had miscellaneous extra-pulmonary disease, with heart disease first, and intestinal disorders second.
   c. Thirty-one per cent had non-tuberculous lung infections with bronchiectasis predominating.

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HEALTH BUILDER NOT ACCEPTABLE

The Council on Physical Therapy reports that the Health Builder of the Sanitarium Equipment Co., Battle Creek, Mich., is claimed to be a "mechanical means of administering massage and vibratory exercise." It consists essentially of an electric motor driving an oscillating mechanism which transmits a vibratory motion by means of a belt, or applicator, to the user. The Council finds the Health Builder unacceptable for inclusion in its list of accepted devices for physical therapy because the firm advertises claims that are misleading, exaggerated or unwarranted; because the advertising and descriptive matter fails to give adequate warning of the dangers associated with its use; and because the firm uses an objectionable name for the apparatus. (Jour. A. M. A., November 14, 1931, p. 1466.)

MEAD'S BREWER'S YEAST

In the announcement of acceptance of Mead's Powdered Brewer's Yeast by the Council on Pharmacy and Chemistry (Jour. A. M. A., May 2, 1931, p. 1477) it was erroneously stated that this product assays approximately 1 vitamin B_2 (G unit) per Gm. It should have read 10 instead of 1. It was also erroneously stated that the unit of vitamin B_1 used for that amount of substance which, added to the diet of rats showing symptoms induced by deficiency of B_1 (F) would give an average weekly gain in weight of 3 Gm. for eight weeks. This should have read 11 to 14 Gm. instead of 3 Gm. Another error was that the product offers not less than 0.98 unit of vitamin B_2 (G) per gram. This should have read 10 units instead of 0.98 unit. (Jour. A. M. A., July 11, 1931, p. 103.)

THE SIGNIFICANCE OF INFRACLAVICULAR PULMONARY TUBERCULOSIS

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THE old doctrine and time-honored teaching that pulmonary tuberculosis almost invariably begins at the apex has, in the past eight years been replaced by the concept of non-apical or infraclavicular infiltration as the initial adult lesion or true incipient tuberculosis. The opening shots at the old teaching came from two sources: 1. The significance, prognostic and clinical, of apical lesions was studied. Braeuning, in a study of patients with apical tuberculosis over a period of seven years, showed that only 7.8 per cent had developed progressive disease. He also showed that only thirteen per cent of his patients with positive sputum gave a history of apical tuberculosis. This report was startling, because it showed that the percentage of cases which progressed from apical to open tuberculosis was lower than the entire mortality from tuberculosis. Similar evidence was presented by Lydtin and Romberg, Redeker and Walter, Kayser-Peterson and others.

2. The actual beginning of progressive destructive tuberculosis was studied. Haudek, drawing from his extensive roentgenological experience, shows that apical lesions usually do not progress; that strictly apical cavities are rare. He, as well as Redeker, states that he has never seen the roentgenological pictures of a fibrocaseous bronchogenic tuberculosis develop from an apical focus.

With all of this strong evidence against apical lesions as the incipient stage of tuberculosis in mind, how then does tuberculosis start? This question was answered in the work of Assmann, Redeker, Wessler, Fishberg, Rhomberg, Ulrici and other prominent investigators, on the basis of the infraclavicular infiltrate as the truly incipient stage of pulmonary tuberculosis.

Before going further, I wish to recall to your minds the work of Ranke, his theory and classification of tuberculosis, and the modifications made by Redeker, which must be understood to appreciate the "new doctrine."

Ranke's three stage classification, with certain modifications, is now almost universally accepted by leading clinicians. He distinguishes three stages in tuberculosis, each one characterized by a different phase of immunity with different modes of propagation of the infection. The first stage is that which is now known as childhood tuberculosis, and includes the site of the first infection, often a Gohn tubercle, and the regional lymph nodes. It is marked by a profound change of all the tissue cells, developing after the first infection what is known as allergy. The tubercle bacilli with the highly irritating lipins contained in the envelope of the bacterium are treated by the body as any foreign body, that is, they are walled off and set apart from normal tissue. Owing to the avascularity of the tubercle, the infection is propagated mainly by the lymph vessels. At this stage the disease is therefore predominately a tuberculous lymphadenitis. Ranke's second stage begins with the first reinoculation of the allergic body. All of the tissue cells have become sensitized and the reaction is a prompt and intense local and general allergic response. The anatomical picture is that of acute inflammation with hyperemia, edema, and emigration of lymphocytes. During this stage, the infection spreads mainly through the blood stream, although other channels are open. This stage is therefore characterized by hypersensitiveness to reinfecting bacilli, by acute inflammation and by distant hematogenous metastasis. The third stage is characterized by a relative anergy and by propagation of the disease through continuity or through the visceral body ducts. This is his last and final stage and in his opinion a return to the second or primary state of allergy is impossible. Redeker points out that so rigid a classification would not account for the cyclic nature of tuberculosis. He states that the order in which the three stages follow each other, from the first infection to death or cure, is reversible as to time; and that a return to a preceding phase, particularly from the third to the second, is quite common. After the first stage, the majority of cases show alternating periods of hypersensitiveness and comparative anergy, corresponding to periods of activity and quiescence. It is plain to see that the second stage

represents the most critical period in a patient's life and that the duration and degree of allergy decide his fate. The appearance, duration and intensity of the second phase of allergy depend

In a study of 117 early infiltrates, Redeker reported the localization as infraclavicular in 58, mid-field in 38, lower field in 15, sub-clavicular in 4 and apical in 2 cases. They are described

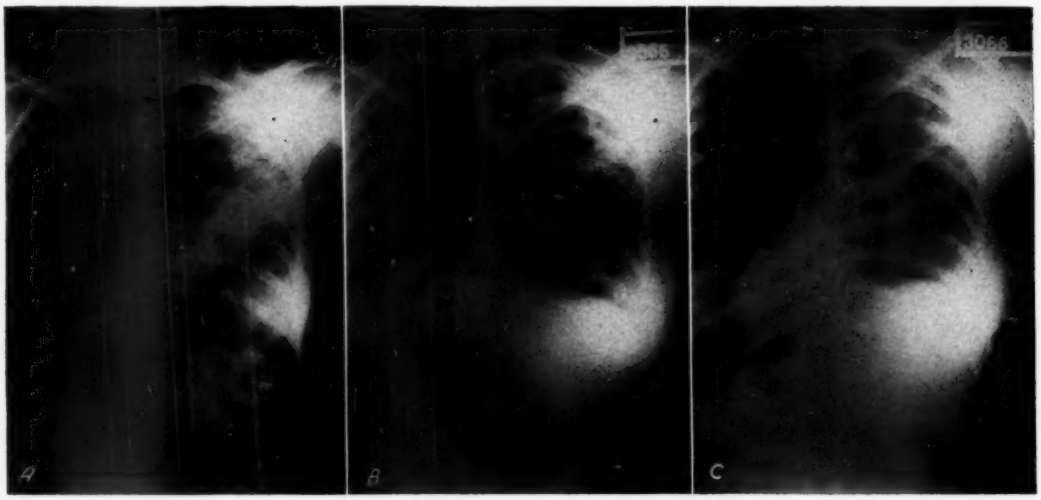

Fig. 1. Infra-clavicular lesion showing progress following early phrenic exeresis. View *A* was taken April 28, 1930; *B*, May 4, 1931; *C*, August 6, 1931.

not only upon the virulence and size of the reinfecting dose, but to a great extent on non-specific factors, as intercurrent disease, age, pregnancy, trauma and the influence of the endocrine and autonomic nervous systems.

On the basis of Ranke's conception, the isolated bronchopneumonic foci as described by Assmann, could have been foreseen. The new focus of reinfection must of necessity be inflammatory in character and could be localized in any portion of the lung to which the bacilli could gain access, either by inhaled air or by the lymph or the blood stream from an old lesion.

The new German school contends that pulmonary tuberculosis nearly always begins with a broncho-pneumonic focus in some part of the lung below the clavicle, from where it spreads by the formation of new foci to the mid-lung and the base, involving the apices at a much later period. They believe that, while late apical tuberculosis is common, incipient apical tuberculosis is extremely rare. The present diagnosis of incipient tuberculosis localized in the apices is in reality a false, late diagnosis and our treatment, not early but delayed.

as soft, cloudy, homogeneous shadows, the size of a cherry to that of a plum, surrounded by normal lung tissue. The physical signs are usually very indefinite or entirely lacking. The subjective symptoms are equally insignificant.

The subject of the early infiltrate versus insidious apical tuberculosis was thoroughly studied, correlating the history of the patient with the findings on his first available X-ray plate, by Douglas, Pinner and Wolepor. From this study and that of Redeker, Assmann and other well known authorities, the following conclusions have been drawn:

1. That the "new doctrine;" of which Redeker is the foremost exponent, is supported by statistical and clinical data.

2. Pulmonary tuberculosis most often begins with non-apical infiltrations, which are characterized by their instability and may progress or retrogress in a very short time.

3. Apical tuberculosis is usually a benign late form, not an occurrence of incipiency, and that rarely does an apical lesion give rise to progressive disease.

4. Progressive and destructive pulmonary

tuberculosis usually starts suddenly with exudative subapical lesions.

5. Lesions may become far advanced and cavitation develop in less than 6 months.

6. Processes leading to active progression and cavitation are usually associated with acute symptoms.

7. The physical signs and symptomatology traditionally described as characteristic for "incipient pulmonary tuberculosis," are misleading for the detection of truly incipient subapical acute processes.

8. Roentgen examination is the only method by which we can exclude pulmonary tuberculosis, which begins with non-apical infiltrates. Radiography of the chest should be used as a routine method.

9. Surgical collapse should be attempted in the treatment of infiltrates that do not retrogress spontaneously in a short time.

10. During the allergic phase, general and functional rest are strongly indicated, whereas the use of stimulating therapy, such as tuberculin, exercise, and heliotherapy, must be opposed.

11. Every effort should be made to diagnose acute infiltrations and to hospitalize patients with this type of lesion immediately.

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THE TUBERCULIN TEST*

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NEARLY everyone has at some time in the past spaded and raked a flower bed in the spring. Minute seeds were then scattered over and raked into the soil. The seeding is followed by a period of time during which it is impossible for a neighbor or anyone but the planter himself to state what kind of seed had been sown in the soil. The seeds must germinate, and even when the seedlings make their first appearance through the surface of the soil, it is impossible for those not knowing the kind of seed planted to determine the species of plant. Only after the sprout has become sufficiently large so as to present definite characteristics, can the species actually be determined.

One may liken the planting of such flower seeds in the earth to the planting of germs of disease in the human body. With many of the germs it is impossible to determine their location or their kind until they have produced changes in the tissues which characterize them. This may require days, weeks, months, and even years with some of the pathogenic micro-organisms. A few of these organisms, very soon after entering the body and before they have produced areas of disease sufficiently large to be detected, bring about changes which make it possible for us to detect their presence by biological tests. One of the best examples is the tubercle bacillus. Within a short time after the tubercle bacillus has entered the body (and found lodgment), it brings about a change which we speak of as allergy and which is very readily detected by the tuberculin test.

Tuberculin was first prepared by Koch and was used by him as a test for tuberculosis in man and animals and as a therapeutic agent. Koch did not understand tuberculin as well as we do today; so some disastrous results followed its administration as a therapeutic agent. The pendulum then swung far toward the side of disfavor. Pirquet and Mantoux in 1907 and 1908 presented methods of applying the test which were harmless. When the test was applied in Vienna and other great centers of civilization, it was found that most persons who had reached the age of fifteen years reacted positively. Therefore, except in infancy and early childhood, the test was again in disrepute.

In many parts of the world the tuberculosis picture has changed almost completely since the days of Pirquet and Mantoux. The opportunities for exposure to tubercle bacilli have been reduced so that the incidence of infection is far lower than previously. Therefore, the value of the tuberculin test has increased and is increasing every year. That the tuberculin test is one of the most accurate tests ever discovered by man may truthfully be said.

The following quotation from Dorset informs us as to the nature of tuberculin: "Tuberculin is the clear, sterile filtrate obtained from culture of tubercle bacilli on a broth medium. The broth medium is essentially nothing but meat extract to which salt and glycerine are added. The cultures of tubercle bacilli on this broth are completely sterilized by heat, and the killed bacilli are removed by filtration. The tuberculin, therefore, contains only the unused portions of the culture liquid plus any soluble substances which may have been formed in the broth as a result of the growth of the bacilli.

"Since tuberculosis is a most serious and fatal disease, it would not be unreasonable to expect that some men would claim that the tubercle bacillus, growing on broth in laboratories, would excrete into the broth poisons or toxins which would be capable of producing in healthy individuals symptoms and lesions similar to those of the disease itself. It is a well known fact, however, that all bacteria under such conditions do not produce soluble toxins or poisons. The broth on which tubercle bacilli have been grown (tuberculin) may be injected into normal animals in doses vastly greater than those used for testing purposes, without causing any ill effect whatever. With tuberculous animals, on the other hand, the case is quite different for they are extremely sensitive to the culture filtrates from tubercle bacilli (tuberculin). This curious fact has a close analogy in the peculiar sensitiveness that certain indi-

*From the Departments of Preventive Medicine and Internal Medicine, University of Minnesota, and the Lymanhurst School for Tuberculous Children. Presented before the 78th Annual Session of the Minnesota State Medical Association at Minneapolis, May 6, 1931.

viduals exhibit to the pollen of plants. For most people this pollen is without effect, and yet it causes most distressing symptoms in hay-fever patients because they in some way have been sensitized to the pollen. The case is the same with tuberculosis and tuberculin. Infection, often to a very slight degree, is sufficient to sensitize animals to tuberculin."

The type of tuberculin to be used for this test has been a subject of considerable discussion. At one time it was believed that a person or animal infected with the bovine type of tubercle bacillus would react positively to tuberculin made from that type of tubercle bacillus only. Experimental studies have proved that such a specificity ordinarily does not obtain. Animals infected with the avian or bovine type of tubercle bacilli will react positively to tuberculin made from the human type of tubercle bacilli. In fact, the veterinarians, who have tested many million cattle, use Koch's Old Tuberculin made from the human type of bacilli.

A great many methods of administering tuberculin have been employed. The majority of workers in the field of tuberculosis are now convinced that the intracutaneous method of Mantoux is superior to all methods known. The dilutions used for this test are simple and may be made by the physician himself or by the pharmacist. The dilution for the first test consists of one part of Koch's Old Tuberculin to nine thousand nine hundred ninety-nine parts of physiologic salt solution. One-tenth of a cubic centimeter of this solution is introduced into the layers of the skin just as one would administer the material for a Schick test. This amount of the dilution contains one-hundredth of a milligram of tuberculin. If the test is negative at the end of forty-eight or seventy-two hours, a second test is usually applied. The dilution for this test consists of one part of Koch's Old Tuberculin to ninety-nine parts of physiologic salt salt solution. One-tenth of a cubic centimeter of this solution is administered in precisely the same manner as the first test, but it contains a full milligram of tuberculin. If this test is negative, we usually feel that tuberculous infection is not present. However, some physicians prefer to continue using stronger concentrations until five or ten milligrams of tuberculin are given for one test.

The diagnostic specificity of tuberculin is evidenced by the positive reaction of animals which have first been proved negative and then were inoculated with tubercle bacilli. Good evidence is also obtained by applying tuberculin tests to members of families in homes where open cases of tuberculosis exist; then applying the test to the same number of members of families in homes where tuberculosis does not exist. Work of this kind has been done in Minnesota by such excellent physicians as Lampson and Slater. Perhaps the best evidence has been contributed by the veterinarians who, after the animals react positively to tuberculin, examine their bodies at postmortem. The high incidence of disease found in the bodies of these animals has proved beyond doubt the specificity of tuberculin.

A positive tuberculin test in the body of a human being nearly always means that somewhere in the body tubercle bacilli have found lodgment. They have multiplied and tubercles have been or are being produced. In other words, there is an area of tuberculous disease somewhere in the body. It may be no greater in size than that of a millet seed, or it may be of sufficient extent to overwhelm and take the life of its host. This area of disease, which is necessary to cause the body to react positively to tuberculin, may be completely under control or it may be progressing. It may have been present many years or it may be of rather recent origin; it may be in the lung or it may be in some part of the body very remote from the lung. The tuberculin test only informs us that the area of disease is present. The tuberculin test is not a test for immunity—it is only a test for allergy.

The tuberculin test is not infallible. Like every other biological test known to man, it occasionally fails. During the time between the entrance of the tubercle bacilli into the body and the development of allergy, which is known as the preallergic stage, the tuberculin test is negative. This usually is a period of from two to three weeks. However, the time varies.

In terminal cases of tuberculosis, allergy apparently decreases. The ordinary dose of tuberculin may cause no reaction, but if the dose is increased to a sufficient extent, even in such cases a positive reaction is obtained. Some believe that tuberculous lesions, particularly those of the childhood type, may, after years, become completely burned out, or perhaps walled off to such an extent that there is no communication between

the products of the tubercle bacili and the adjacent tissues. Individuals possessing such lesions may lose their allergy and hence react negatively to the tuberculin test. The available evidence of such complete control of tuberculous lesions is slight.

Perhaps the convincing evidence of the value of the tuberculin test has been demonstrated by those interested in the live stock industry. The veterinarians saw early the significance of the tuberculin test. In fact, Gutman used tuberculin to test cattle in Dorpat, Russia, as early as 1891. Although tuberculin was used in this country to test cattle in 1893, the intensive and extensive campaign did not begin until about 1917. In the interval between 1893 and 1917, work preparatory for this campaign was done.

The results accomplished by the veterinarians are astounding. In 1930 alone, 12,506,198 cattle were tested with tuberculin in the United States. Almost 1.7 per cent reacted positively. In 1918, 4.9 per cent of the cattle tested reacted positively. This represents a large reduction in the number of reactors. In the State of Minnesota, fifty-five of our eighty-seven counties have reduced the number of reactors to tuberculin from approximately 7 per cent to 0.28 per cent. In the State of Wisconsin, there are certain counties where tuberculosis has been completely eradicated from cattle. For six years it has been impossible to find a single positive reactor.

From an economic standpoint the saving to this country from the work of the veterinarians has been so great that most of us cannot even conceive of the figures. Dr. H. R. Smith, Commissioner of the National Live Stock Exchange, makes the following statements:

"If the percentage of cattle condemned for tuberculosis in the United States had been as high during 1930 as during 1916, when the campaign was started, there would have been 21,387 more cattle carcasses condemned than were actually condemned during 1930. On the basis of twenty cattle to the car and thirty cars to the train, this represents thirty-five trainloads of cattle saved from the rendering tanks in 1930 as compared with 1916.

"If the percentage of hogs condemned for tuberculosis during 1930 had been as high as during 1916, there would have been 43,059 more hog carcasses condemned during 1930 than were actually condemned. On the basis of sixty-five hogs to the car and thirty carloads to the train, this represents twenty-two trainloads of hogs saved from the rendering tanks, or a total of fifty-seven trainloads of cattle and hogs saved for food.

"If those cars were to be placed in one solid train, allowing forty feet, outside measurement of each car, it would represent a train thirteen and one-tenth miles long saved from the grease tanks during 1930 as compared with 1916.

"A train of cattle and hogs six and eight-tenths miles long was saved from sterilization during 1930 as compared with 1916, on which sterilized carcasses the loss is approximately one-half.

"Comparing 1930 with the year previous, 1929, the saving from condemnation was eight trainloads of cattle and two trainloads of hogs, or a solid train two and three-tenths miles long. Another train of cattle and hogs nearly one mile long was saved from sterilization, which product is sold as canned meat and labelled 'Sterilized.'"

The campaign has gained such momentum and proved its great value so that in 1930 the Federal appropriation was $6,361,040, while State appropriations total $12,154,226. Already two million cattle which reacted positively, together with the bacilli they contain, have been destroyed. Here is the greatest demonstration of tuberculosis control of all time. For some time we feared and fought tuberculosis in animals on the ground that it was dangerous to the human family. The scene has changed. The veterinarian is now fearing exposure of animals to tuberculous members of the human family.

In the human family we must proceed to a certain point exactly as the veterinarian does. In other words, we must adopt the area testing plan, keeping in mind that tuberculin is highly specific and that the test is harmless when properly administered. Already area testing has been practiced in a very limited way, but the procedure is gaining in favor. In Minnesota, such men as Slater and Lampson blazed the trail. The work of these physicians has been quoted in medical literature around the world. As early as 1925, Slater tested children in a rural community and found that only 10 per cent reacted positively to the tuberculin test. In the last two years, the Minnesota Public Health Association and the State Board of Control have done a great deal to stimulate interest in area tuberculin testing of human beings. The most encouraging result has been the finding of the incidence of tuberculous infection very low among high school girls and boys and even among those of college and university age. Today, the zeal of an idealist or an enthusiast is not necessary for the recommendation of area testing of human beings because the procedure has become a standard one. Chadwick

of Massachusetts and later of Detroit. McCain of North Carolina, Rathbun of New York, and many others had proved the great value of this procedure before the Minnesota Public Health Association and the Minnesota State Board of Control adopted it.

The mere application of tuberculin tests is of no avail as a tuberculosis control measure. It only informs us of the incidence of tuberculous infection. The veterinarians slaughter all reactors. At this point, we cannot continue to follow the lead of the veterinarian. Our problem now becomes much more complicated than his, but we are in a position to institute a program which he could never carry out, namely, the program of education. From this point then it becomes a matter of educating the public so that the procedures recommended will be accepted. Without this education we are unable to carry on. With this education, we can proceed from the positive reactions to the source of their infection.

Tuberculosis is a communicable disease; therefore, every person who reacts positively to the tuberculin test has been exposed to tubercle bacilli. To find the source and stop it is the best known treatment for the person who already reacts positively to tuberculin. The fact that continued exposure even among adults rather frequently leads to disaster is well established. We have in mind not only the protection of the positive reactor but the protection of every person who subsequently comes in contact with that positive reactor. We also have in mind the welfare of the person who is the source Frequently such persons are found not to be ill. A small percentage of them never are ill with tuberculosis yet they are spreading bacilli so that we speak of them as carriers. Another group who are not ill now but who have tubercle bacilli in the sputum will sooner or later become ill. If their disease is detected, this illness may be prevented. Thus, it is the good of the community that takes first place in this program.

By such area testing and follow-up work, we can very quickly construct maps of townships, counties, states, and the Nation just as veterinarians have done. These maps should tell us where the foci of tuberculosis are. When this is done, we will find areas that are veritable nests of tuberculosis and other areas where very little tuberculosis exists. With this knowledge at hand we know where to concentrate our efforts. In other words, we are no longer working blindly.

But what shall be done about the child who is found to react positively to the tuberculin test? When a child is found to react positively to the tuberculin test and no evidence of tuberculous disease can be demonstrated, the question that often arises is, what explanation should be given the parents. One person says that if we tell the parents that tubercle bacilli are in the child's body, we create tuberculophobia. A physician cited the following example: "Tuberculin tests had been applied to the school children in a rural community. The parents of one child, who reacted positively, complained that when this fact was noised about among the other children, those of the same neighborhood who had been accustomed to walking to school with this child, promptly refused to even walk with him." Another physician stated that when a child in a certain community had been transferred from regular school to a special school for tuberculous children, the children of the neighborhood refused to play with him before and after school hours.

I believe that our answer to the original question, "What shall we tell the parents?" should be "Tell them the truth." Tell them that through exposure the children have taken into their bodies of the germs of tuberculosis and that we cannot determine from the tuberculin test whether these germs have been brought under control. Even if we could state that at the time the germs are under control, we cannot go further and say that they will always remain under control. We can state with safety that every child who has had a tuberculous infection, as manifested by a positive tuberculin reaction, is a potential case of clinical tuberculosis, whether it be the lungs, the bones and joints, or other parts of the body. If they are not casting tubercle bacilli from their bodies, they are not a menace to other children at the time. The consoling fact may be told them that only a very small percentage of those who react positively to the tuberculin test develop a clinical form of disease. But the unfortunate fact which we must also inform them of is that we have no way to determine which child will develop clinical disease at any time. Therefore, the only honest way out is to advise measures, such as protection from further exposure, the building and maintaining of what we call high resis-

tance against disease, and keeping such cases under medical and nursing supervision.

The measure of primary importance is the attempt to discover and to arrest the source of infection whether it be in the home or elsewhere. This may be done by isolating the diseased members of the family or by teaching them how to prevent the spread of tubercle bacilli to others. The child's best chance for recovery is promoted when further exposure to tubercle bacilli is stopped. If exposure be allowed to continue, the infected child is in great danger. The children who react positively to tuberculin, but who have no demonstrable manifestation of disease, should be kept under observation, perhaps not strict observation, but they should be supervised and examined at least two or three times in every year. Each child who reacts positively to tuberculin and who has demonstrable disease should be kept under very close observation. If the disease is of the childhood type, the treatment required will depend upon its stage at the date of discovery. It may be very recent disease in the inflammatory stage. If so, strict bed rest may be indicated for a while, although the majority of them recover without it. On the other hand, the disease may have become latent so that lime deposits in the lungs and lymph nodes are easily demonstrated by the X-ray. The presence of lime does not by any means indicate that the disease is healed. The following statement by Dr. H. E. Robertson, Professor of Pathology, Mayo Foundation, is significant: "I am very greatly impressed with the microscopic study of these apparently healed lesions. Very many of them show evidence of some activity histologically and I am steadily being strengthened in the opinion that the tuberculous lesion in most instances constitutes a menace of renewed activity as long as the individual may live." He is inclined to believe that the above statement applies particularly to the first infection or childhood type of tuberculosis, including the involvement of the lymph nodes at the root of the lungs. Dr. Robertson also states that he frequently finds calcium deposits, caseous material, and activity histologically all in one lesion.

Therefore, these children need special attention. They should have more rest than the normal child. In addition to long hours in bed at night, they should have one or two rest hours during the day. They must receive the proper kind of food in sufficient quantities. There is danger in overlooking the fact that the child's body is growing and that he is extremely active in play; therefore, much food is required. This food must contain the vitamins, animal proteins and other properties so necessary for energy, production, growth, and repair of the body. These children have a better chance in special schools for tuberculous children than in the regular schools. In such schools they are with others of their kind who are receiving the same treatment and they do not object to the special routine. These children are potential spreaders of tubercle bacilli, inasmuch as the caseous or cheesy material in the lymph nodes may possibly find its way into the bronchial tubes, thus contaminating them with tubercle bacilli which may be spread to the bodies of others through coughing, sneezing, and expectorating. In a special school for tuberculous children, a careful watch may be kept for such developments and for the minimal stage of the adult type of disease since every child with latent childhood tuberculosis is a potential case of adult tuberculosis. For children with progressive tuberculous disease, whether it be of the childhood or the adult type, strict bed rest should be employed. If the home conditions are not favorable, most certainly institutional care should be sought.

EXTRAOCULAR PALSIES*

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ANTHONY FEILING[1] says, "Ocular palsies constitute a symptom of the greatest interest and importance. They are of interest because they offer a very wide field for diagnostic skill, as well as an opportunity for a study of many different diseases. They are of importance because they are not infrequently one of those early signs of disease of the nervous system which call for exact diagnosis and appropriate treatment." A detailed discussion of all the phases of extraocular palsies would be superfluous and too complex and time-consuming for a paper of this nature. It is my intention, therefore, to point out only some of the more elementary anatomical, physiological, and clinical considerations pertinent to the subject.

ANATOMY AND PHYSIOLOGY

There are seven extraocular muscles subserving movements of the eyeball. They are the levator palpebræ superioris, superior, internal, and inferior recti, and the inferior oblique, all supplied by the oculomotor or third cranial nerve; the superior oblique supplied by the trochlear or fourth cranial nerve; and the external rectus supplied by the abducens or sixth cranial nerve. The levator palpebræ superioris is the only one of the extraocular muscles that acts alone, the others always acting in pairs or groups. Therefore, all extraocular movements are associated movements and their performance depends upon the existence of central connections between the nuclei of the various cranial nerves subserving them.

The nuclei of the oculomotor nerves lie in the gray matter surrounding the floor of the aqueduct of Sylvius. The nuclei of the third and fourth nerves are almost contiguous and lie forward toward the floor of the third ventricle. The nucleus of the sixth nerve lies farther caudally, near the floor of the fourth ventricle, and is separated from the third and fourth nuclei by a definite interval. All of the nuclei are connected by a very important structure known as the dorsal or posterior longitudinal fasciculus. This bundle of fibers is responsible for the harmonious synergetic action of the extraocular muscles supplied by the various oculomotor nerves. One of its chief functions is to bring the action of the external rectus muscle of one eye (sixth cranial nerve) into relationship with the action of the internal rectus of the opposite eye (third cranial nerve). This relationship is responsible for lateral conjugate deviation of the eyes, which is one of the most important of all extraocular movements. (Fig. 1). The exact anatomical basis for upward conjugate deviation has not yet been determined definitely, but the center for this movement is thought to be in the region of the anterior corpora quadrigemina. At least, lesions in this vicinity frequently are accompanied by paralysis of upward conjugate deviation.

The centers for extraocular movements are under the control of very important supranuclear centers in the cerebral cortex, situated most probably in the second frontal convolution of the opposite side. Paralysis of this center causes deviation of both eyes toward the side of the lesion, while stimulation causes deviation toward the opposite side. Also, paralyses due to a lesion in this area are usually more or less permanent, while the reflex movements of the eyes are not affected.

CLINICAL CONSIDERATIONS

Because of the complicated anatomical arrangement of the structures concerned in extraocular movements, paralyses may result from a great variety of lesions situated in any one of a number of places. For this reason it is necessary that we have some kind of a working scheme the better to enable us to understand the pathological processes concerned when we encounter an extraocular palsy.

There are two possible ways in which to classify extraocular palsies. They may be grouped according to the anatomical location of the lesions causing them, or they may be considered

*Read before the meeting of the Ramsey County Medical Society, May 25, 1931.

according to the nature of the lesion concerned (etiologically). For the anatomical classification I will use the outline suggested by Leslie Paton.[2] According to this writer ocular palsies may be divided into three main groups with sub-groups as follows:

I Paralysis of cerebral origin
  A. Supranuclear lesions
    1. Cortical
    2. Sub-cortical
  B. Internuclear lesions
  C. Nuclear and nerve root lesions
II Paralysis of extracerebral origin, *i.e.*, of nerve trunks
  A. Intracranial
  B. Intraorbital
III Paralysis of muscular origin

As with disturbances of function any place in the nervous system, the causative agent in oculomotor palsies may be inflammatory, vascular, neoplastic, degenerative, traumatic, or the disturbance may be due to a congenital anomaly in the structures involved.

PARALYSES OF CEREBRAL ORIGIN

Case 1.—C. V. D., a black male, aged 54, was admitted to the Neurological Service at Ancker Hospital July 10, 1930, in a comatose condition. History obtained from the relatives indicated that he had been suffering from hypertension and nephritis for a number of years. Four months previous to his admission he had had a retinal hemorrhage in the right eye. A few hours before admission, while mowing his lawn, he had suddenly fallen to the ground unconscious, breathing heavily, and frothing at the mouth. A few minutes later he vomited. He was taken into the house and seen by a physician, who sent him into the hospital, where I saw him shortly afterward. The neurological examination showed a flaccid paralysis of all four extremities with absent tendon and superficial reflexes. No pathological reflexes could be elicited. Breathing was stertorous and the left side of the face puffed out upon each expiration. Pupils were equal and regular but did not respond to light. (He had received morphine before being taken to the hospital.) Both eyes were turned toward the right. Occasionally they would move spontaneously toward the midline, and the movements of both eyes were synchronous. However, they always would come to rest in the position of right lateral conjugate deviaiton. The clinical diagnosis was massive cerebral hemorrhage in the right hemisphere involving the posterior part of the second frontal convolution, either cortically or subcortically. The patient died without regaining consciousness, and autopsy confirmed the clinical diagnosis.

In the anatomical discussion it was stated that the third-sixth nerve complex with its connecting posterior longitudinal fasciculus is under the control of a center in the cortex of the opposite side and that paralysis of this center caused the eye to turn toward that side. "The patient looks toward the side of his lesion." In the above case there was a paralytic lesion, as evidenced by the flaccid paralysis of all four extremities. The fact that there was lateral conjugate deviation of the eyes to the right indicated to us that the lesion was in the right hemisphere. This is an example of an oculomotor palsy resulting from a supranuclear lesion.

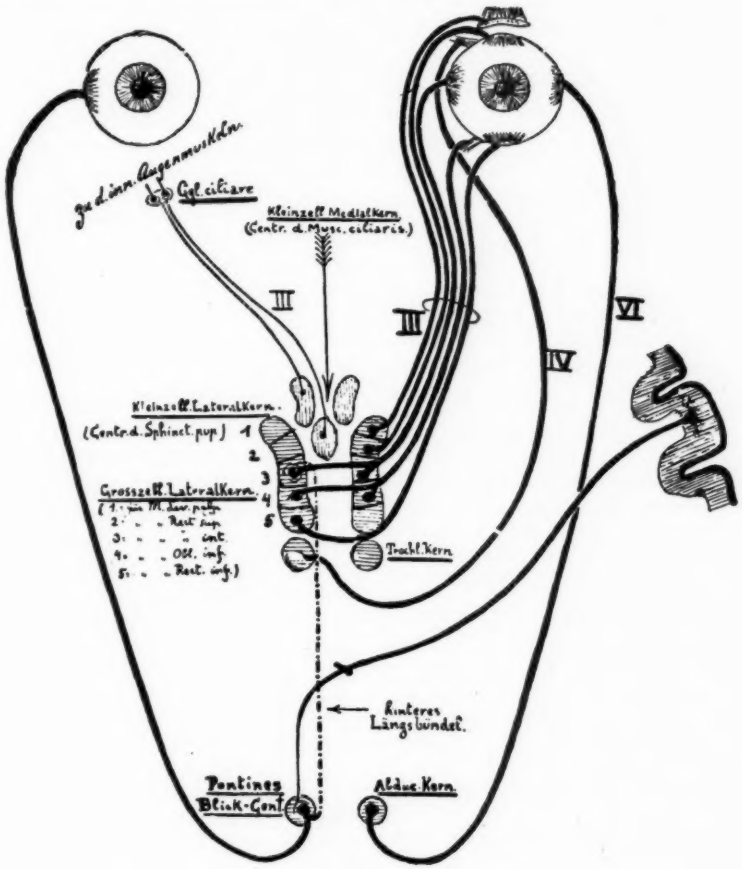
Case 2.—L. E., a single male, aged 37, was admitted to the Neurological Service of Ancker Hospital in August, 1930, suffering from blurred vision, pain in the chest, difficulty in walking, and mental confusion. There was a history of excessive alcoholic indulgence extending over a period of several months. The physical examination was grossly negative and all noteworthy findings were confined to the nervous system. The left pupil was slightly larger than the right, and both reacted sluggishly to light and in accommodation. There was moderate congestion of both optic discs. Concerning the extraocular movements, convergence and movements upward and downward were full, steady, and synchronous. However, there was paralysis of conjugate deviation to both right and left. In other words, the eyes seemed to be fixed in the midline as far as lateral conjugate movements were concerned, but that there was no paralysis of the internal recti was shown by the fact that convergence was normal. Moreover, the fact that there was no strabismus indicated the absence of a sixth nerve palsy. What really existed was a paralysis of *movement* rather than of any individual nerves. Both knee and ankle jerks were absent, there was bilateral ataxia, and slight atrophy of the calf muscles. Blood Wassermann and spinal fluid were negative.

The patient developed symptoms of a Korsakow psychosis and was committed to the state hospital for the insane. On October 31 it was reported that all his extraocular movements had returned to normal except for a fine vertical and horizontal nystagmus.

While the diagnosis in this case could not be confirmed by autopsy, the probabilities are that this patient had an alcoholic toxic-degenerative process in his mid-brain interfering with the conductivity of the posterior longitudinal fasciculus. I present it as an illustration of an ocular palsy due to an internuclear lesion.

Nuclear lesions may be divided into two groups, acute and chronic. Among the acute types are found those accompanying the various toxemias such as botulism, encephalitis, influenza, and alcoholism. Frequently one sees a nuclear ophthalmoplegia clinically, and upon postmortem examination of the oculomotor nuclei is

unable to find any anatomical explanation for the paralysis. I recall a patient examined by Dr. Hammes and me a few years ago who had progressive paralysis of all of her motor cranial nerves beginning with the oculomotor group and finally involving those in the medulla oblongata. The progression, extent, and character of the paralysis indicated a nuclear involvement, yet post-mortem examination of serial sections of the brain stem failed to disclose any pathology in either the cranial nerve nuclei or in the nerve roots. In the chronic nuclear palsies one must always think of syphilis, although there are some other more rare types of involvement, such as the congenital ophthalmoplegias of nuclear origin, and the alternating nuclear ophthalmoplegias.



INNERVATION OF THE OCULAR MUSCLES.

III = Oculo-motor nerve.
IV = Trochlear nerve.
VI = Abducens nerve.

Fig. 1. Diagram illustrating the central connection between the third and sixth cranial nerve nuclei. The broken line (labeled "hinteres Längsbündel") represents the posterior longitudinal fasciculus. From Bing's "Gehirn und Auge."

PARALYSIS OF EXTRA-CEREBRAL ORIGIN

Under this group of oculomotor palsies we include those due to involvement of the nerve trunks themselves, and divide them into two groups, intracranial and intraorbital.

A good example of intracranial, extracerebral type of involvement is that seen in Gradenigo's syndrome. The occurrence of this syndrome de-

pends upon the fact that the sixth or abducens nerve passes over the tip of the petrous portion of the temporal bone within the cranial cavity. Accordingly, in mastoiditis when the infection has extended inward to produce a caries of the petrous portion, there sometimes is involvement of the sixth nerve with a consequent turning in of the eye on that side. This condition usually is accompanied by severe pain in the side of the face and up over the scalp on the affected side. This pain is thought to be due to a simultaneous involvement of the fifth or trigeminal nerve.

Basal skull fracture is a frequent cause of extracerebral, intracranial ocular palsies.

Case 3.—B. D. F., a white male, aged 38, was admitted to the Neurological Service of the Ancker Hospital in July, 1929, suffering from acute alcoholism, severe contusions and lacerations of the scalp, bleeding from the nose and ears, and a divergent squint. His past history was irrelevant, and he never had had any trouble with his eyes. He stated that he had been on a drinking party during which a fight started. He thought that somebody struck him over the head but could not remember anything until he regained consciousness in the hospital. When I saw him he still had some oozing of blood and cerebrospinal fluid from his right ear, and there was a complete paralysis of all the muscles supplied by the right oculomotor nerve. The pupil was dilated and did not respond either to light or in accommodation. The eyeball was turned outward and could not be brought toward the midline either in convergence or in conjugate movement with the other eye. There also was paralysis of the right superior and inferior recti. The neurological examination was otherwise negative. A diagnosis was made of basal skull fracture with either tearing of the right oculomotor nerve at its exit from the brain in the interpeduncular space, or involvement of the nerve by a basal hemorrhage. Unfortunately, the patient left the hospital against medical advice before sufficient time had elapsed to determine the nature of the oculomotor involvement. However, the absence of any other neurological signs indicated that the nerve was injured outside the brain substance.

Intraorbital oculomotor palsies may be single or multiple and can result from any pathological process within the orbit or at the entrance at its posterior pole of the oculomotor nerves.

Case 4 was that of a young adult woman seen in the Clinic of Dr. James Collier at Queen's Square Hospital, London. She stated that about two weeks previous to her admission to the hospital she began to have severe paroxysmal pains in the region of her right orbit. A short time later it seemed as if her right eye were bulging and it was tender on pressure. There also was pain in the right side of her forehead. Three days before her admission she began to have diplopia when looking to the right, and later on attempts to look in any direction were accompanied by diplopia. The neurological examination was negative except for a complete right ophthalmoplegia externa associated with an impairment of touch and pain sense over the right side of the forehead. The blood Wassermann was negative, and the spinal fluid was normal. A diagnosis was made of an inflammatory lesion in the region of the right sphenoidal fissure impinging upon the third, fourth, and sixth nerves, and the ophthalmic division of the right fifth nerve. The optic nerve was spared because it enters the orbit through another opening, the optic foramen. The patient was given mercury and sodium salicylate by mouth and after about ten days in the hospital she began to improve. After three weeks in the hospital she was discharged practically cured except for a very slight weakness of her right sixth nerve and a questionable hypalgesia of the right side of her forehead.

PARALYSIS OF MUSCULAR ORIGIN

One of the most frequent causes of oculomotor palsies of muscular origin is myasthenia gravis. James Taylor[8] says that about 80 per cent of the cases of myasthenia gravis that he has seen were at the Royal London Ophthalmic Hospital. Ptosis and diplopia belong to the so-called "permanent" symptoms of myasthenia gravis and may precede the weakness of the other muscles of the body by months and sometimes even years.

Case 5.—Mrs. B. S. F., white, aged 48, was referred to Dr. E. M. Hammes by Dr. George Walker of St. Paul on December 4, 1925. Her family and past histories were negative and she stated that in the spring of 1925 she began to have difficulty in swallowing and talking. Along with this there also was some weakness of the jaw muscles which came on if the patient chewed for any length of time. The weakness of the muscles of chewing and swallowing would proceed to utter exhaustion, from which they would recover after a period of rest. After thoroughly chewing her food the patient would find it difficult to swallow as "it would pile up against her soft palate." Also toward afternoon and evening the patient's voice would become muffled and she would find it difficult to make people understand what she was saying. All of her symptoms of muscular weakness would disappear when she was thoroughly rested.

Concerning her oculomotor mechanism, the patient noticed that when she became fatigued her right eyelid would droop almost to closing. Also, after reading for any length of time she would see double (fatigue of the internal recti). These symptoms would disappear after rest only to return when the patient resumed her activities. The neurological examination was entirely negative for organic signs except for some ptosis of the right eyelid. A myasthenic reaction was obtained in the muscles of the forearms. The blood Was-

sermann was negative and the cerebrospinal fluid was normal. The clinical diagnosis was myasthenia gravis. In this case the ocular palsies were transient and appeared after other myasthenic symptoms had been present for several months.

Another condition in which one sometimes finds oculomotor palsies of muscular origin is Gräves' disease. Garvey quotes Halloway, Fry, and Wentworth, who studied the ocular signs in 100 unselected cases of goiter and found two cases of paresis of the superior oblique muscles. He also reports a case of his own in which a complete ophthalmoplegia externa preceded by some months other clinical signs and symptoms of a typical Graves' disease. Ten months after a subtotal thyroidectomy there was some improvement in the ocular signs.

The outline and case reports just presented are intended to give a simple working basis for a clinical study of extraocular palsies. Obviously all of the various types of paralysis cannot be included, and in many instances there can be no sharply defined limits between lesions affecting nuclei, nerve roots, or association fibers. Syphilis, for instance, is capable of producing an oculomotor paralysis in numberless different ways. It may affect any part of the oculomotor apparatus, and, according to Paton, is responsible for about 40 per cent of all cases of ophthalmoplegia. Other conditions, such as disseminated sclerosis, alcoholism, encephalitis, and others, may affect the oculomotor mechanisms in a variety of ways and frequently it is extremely difficult to determine clinically whether we are dealing with a pure nuclear, intranuclear, or a nerve root lesion, or whether it is a diffuse process involving several structures. Sometimes a study and proper evaluation of the concomitant signs and symptoms is of great value in differential diagnosis.

As an aid in enumerating the various clinical conditions in which we encounter ophthalmoplegias, I refer to Paton's[2] classification of ocular palsies from an etiological standpoint.

I. Acute and sub-acute ophthalmoplegias
   - A. Poisons—alcohol, lead, botulism, carbon monoxide, sulphuric acid, etc.
   - B. Infective agents—encephalitis, diphtheria, influenza, syphilis, etc.
   - C. Trauma
   - D. No etiological factor—according to Uthoff 33 per cent

II. Chronic (progressive) ophthalmoplegias
   - A. An isolated lesion—monosymptomatic ophthalmoplegia externa
   - B. Tabes and general paresis—about 20 per cent of all ocular palsies (Uthoff)
   - C. Disseminated sclerosis—usually nerve root
   - D. Bulbar palsies, progressive muscular atrophy
   - E. Diabetes—most likely a neuritis
   - F. Graves' disease

III. Congenital ophthalmoplegias of nuclear origin

IV. Unilateral ophthalmoplegia

V. Recurrent or alternating ophthalmoplegia of nuclear origin

The above classification is not wholly satisfactory when used simply alone. For a proper evaluation and interpretation of ocular palsies it is necessary to consider them from both the anatomical and the etiological standpoints. Accordingly, Paton's classification is extremely useful.

In this discussion no attempt has been made to delve into or expound the anatomical and physiological minutiæ of the oculomotor mechanisms. Inasmuch as there still are many controversial aspects to the subject, such an attempt would be too time-consuming and not pertinent to my purpose, which has been merely to present the clinical applications of some of the more clearly established and elementary principles involved.

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RECENT ADVANCES IN THE STUDY OF THE CAUSE AND TREATMENT OF LEUKORRHEA*

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LEUKORRHEA is usually due to lesions of the cervix or vagina, rarely to disease in the upper part of the genital tract. A certain few conditions in the body of the uterus, such as adenocarcinoma, submucous fibroids, and polyps may lead to an appreciable white discharge, but endometritis and salpingitis are now given slight consideration as basic pathological conditions in this connection. The former occurs only rarely, and the diseased tube probably does not discharge its inflammatory products into the lower tract. Excluding malignant conditions, endocervicitis is the most common cause of leukorrhea, while vaginal infections with the Trichomonas vaginalis and with the Monilia group of fungi represent the latest additions to recognized etiological factors.

ENDOCERVICITIS

Endocervicitis is commonly preceded by gonorrhea or by an obstetrical episode. Laceration of the cervix incident to childbearing may open the way to infection with various microörganisms of low virulence. The appearance of cervicitis in virginal women suggests that occasionally a blood-borne infection may involve the cervix. The only symptom of the condition is leukorrhea, which tends to be aggravated by the pelvic hyperemia incident to menstruation and to pregnancy, and secondarily by debilitating diseases. The cervix appears enlarged and frequently presents dilated gland structures (Nabothian follicles) on its vaginal surface. Usually there are bright red areas of erosion or eversion, extending out from the os on the anterior or posterior cervical lip, and representing patches of cervical mucosa, which has become exposed by cervical tears (eversion) or has proliferated to replace the vaginal mucous membrane (erosion). Not infrequently these areas produce contact bleeding and arouse a suspicion of malignant change, which can be eliminated only by biopsy.

The cervical glands are compound racemose in character and penetrate deeply into the body of the cervix, beyond the reach of local antiseptic applications. At most, only temporary relief can be expected from such treatment, or from douches which merely wash away the secretion already discharged from the infected glands. Consequently, these modes of treatment have been largely discarded and newer methods are advocated. The fine-wire, nasal, electric cautery is very effective in that it destroys the infected glands and thus removes the source of the discharge. With the cautery wire heated cherry-red, lineal cauterizations are made in the canal and over the exposed eroded or everted areas. After several weeks the treatment may be repeated if inspection shows that the lesion has not been completely cured. The one apparent contra-indication is acute or subacute pelvic inflammatory disease, which may become acutely exacerbated following cauterization. The surgical treatment of cervical leukorrhea is occasionally indicated: simple trachelorrhaphy for patients with old lacerations and eversion, and the Sturmdorf operation for certain persistent cases with involvement of the entire cervical mucosa. The use of the cautery for the control of an increased leukorrhea during pregnancy is debatable; it may be done gently but probably carries some risk to the continuance of gestation.

Until recently, vaginal infection, except with the gonococcus, has been largely ignored in considerations of the etiology of leukorrhea, but we are now convinced that such local conditions are frequently concerned with the production of an abnormal vaginal discharge. Many women have been accused of having gonorrhea because of a persistent vaginitis and leukorrhea, when in reality they suffered from non-venereal parasitic infections. And other unfortunates have been submitted to hysterectomy and salpingectomy without relief, when the disease was local in the vagina. Two distinct organisms—the Trichomonas and the Monilia—have been isolated from such patients, and very probably others still remain to be identified.

*From the Department of Obstetrics and Gynecology, State University of Iowa. Read before the Southern Minnesota Medical Association, Faribault, Minnesota, August 24, 1931.

TRICHOMONAS VAGINALIS VAGINITIS

Trichomonas vaginalis vaginitis is apparently promoted by lack of cleanliness, since clinic patients are more commonly affected than private patients, and colored women than white; but other factors must enter the picture, since very fastidious women may show the condition. The discharge is typically highly acid in reaction, of a muco-purulent consistency, creamy yellow in color, and appears foamy or frothy. Vaginal and vulval burning, itching, and smarting are common complaints, and may be more annoying than the profuse discharge. The symptoms tend to become worse during or after the menses, possibly because the reduced acidity in the vagina at this period favors the growth of the parasites. The vaginal mucosa is intensely reddened and may appear granular. Minute ulcerations are occasionally present. Digital or speculum examination may be very painful.

Diagnosis is made by examining the fresh discharge under the microscope in a hanging drop preparation or on an ordinary glass slide, the cover slip being kept from the slide by interposing two or three cotton threads. The oval parasite is recognized by its motility, which is produced by the rapid vibration of several (probably four) flagella attached to one pole. The organisms are larger than leukocytes but smaller than the vaginal epithelial cells. They do not stain easily and cannot be found in smears stained by the usual methods. Culture is possible but rather difficult, and therefore not useful as a diagnostic measure. Identification of the organisms in the vaginal discharge does not prove their causal relationship to the symptoms, since they may be harmless invaders, as certain writers have postulated, but if other etiological factors cannot be involved, the assumption is that the trichomonads are producing the symptoms. The situation is complicated by the fact that many women harbor the parasites in the vagina and yet complain of no irritation or leukorrhea. There is no evidence that the organisms ever penetrate higher in the genital canal than the vagina. They may be present in the urine.

A very similar organism, Trichomonas hominis, is commonly present in the intestinal canal, where it seemingly produces no symptoms. It has been argued that the two parasites are really identical, and that observed variations in their form and cultural activities depend upon the medium in which they grow. If such identity can be established, the source of the vaginal infection becomes quite evident, but otherwise we have no good idea of the mode of infection.

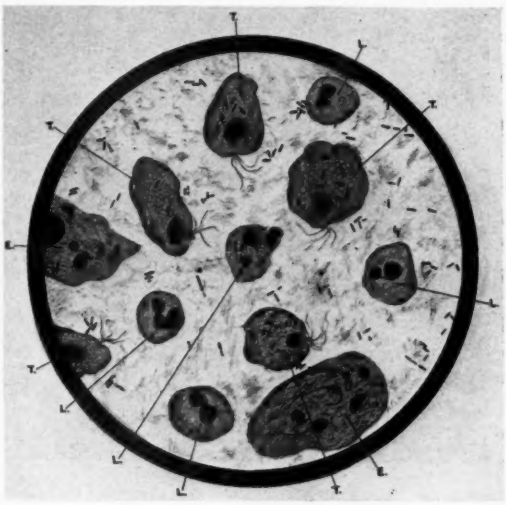

Fig. 1. Drawing of vaginal smear, showing *T*—Trichomonas vaginalis, *L*—Leukocytes, and, *E*—Epithelial cells.

Treatment is unsatisfactory. Many cases respond to various simple medicaments, while occasional patients prove refractory to every form of therapy. Among the methods most frequently advised are:

1. Acid douches—0.5 per cent lactic acid, or corresponding strengths of other organic acids. Lactic acid contraceptive jelly.

2. Drying by a current of warm air from a hair-dryer, or by packing the vagina with kaolin or some similar powder.

3. Cleansing with repeated douches, or, in intractable cases, scrubbing the vagina thoroughly with green soap.

4. Antiseptic solutions, as 1 per cent compound solution of cresol; 1 to 5,000 bichloride of mercury; 1 to 8,000 methylene blue with glycerine; half strength tincture of iodine; 10 per cent boroglyceride; and many others. None of these is specific, but all have their advocates.

With the infection limited apparently to the vagina and with the parasite so easily killed *in vitro*, it is difficult to explain the persistent character of the infection unless one assumes that

the organisms burrow beneath the mucous membrane, or that an intestinal infection leads to repeated reinfections. No definite answer to this question can be given at present.

Fig. 2. Vaginal smear showing Monilia—mycelia and conidia—together with many vaginal bacilli and a few leukocytes.

MONILIA VULVO-VAGINITIS

Monilia vulvo-vaginitis is due to infection with the fungus which is commonly recognized as the cause of oral thrush in the newborn. It is predisposed to by pregnancy and diabetes, when presumably the greater acidity of the vaginal discharge favors its growth. The chief symptoms are vulval and vaginal irritation, which may be so extreme as to interfere seriously with sleep, and usually a slightly increased discharge. Examination shows the vagina markedly reddened, with the mucous membrane occasionally granular in appearance. In rare instances, white thrush-like patches of fungus are adherent to the mucosa, which bleeds slightly when the growth is removed. The vulval skin may be irritated and sometimes presents an intertrigo. Examination may be extremely painful. In the non-pregnant, the symptoms are usually worse just before the menses, when the vaginal discharge is more acid, and are relieved by the flow. Symptoms are more common in the latter months of pregnancy, but are usually completely relieved by delivery. In diabetics, insulin and dietary control of the disease frequently cause the symptoms to disappear. The organism is often present without producing symptoms: in 56 out of 156 (36 per cent) of pregnant controls, and in 14 out of 200 (7 per cent) of normal non-pregnant women. Parity seems to increase the chance of infection, but virgins may show the

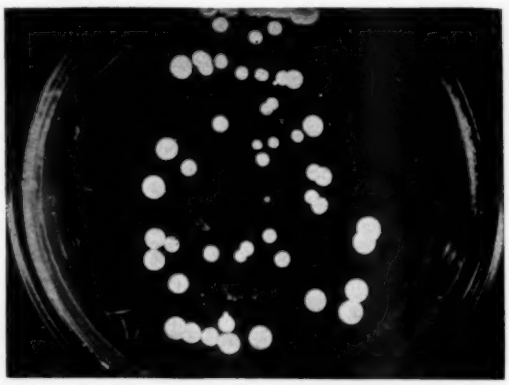

Fig. 3. Forty-eight-hour plate culture of Monilia on Sabouraud's medium.

condition. Nothing is known of the mode of infection.

Diagnosis is occasionally (5 per cent) possible in hanging drop preparations, when the thread-like fungus may be visible, but is somewhat easier in smears stained by the Gram method. The fungi are Gram-positive and appear in two forms, conidia, or spore forms, and mycelia, or thread-like filaments. Culture on Sabouraud's medium (glucose-peptone-agar) adjusted to a P_H of 5.5 is most certain. The organism usually grows in pure culture, although occasionally coccal or bacillary forms will survive the high acidity. Approximately 30 per cent of diagnoses can be made by the smear method, but it is much better to rely upon cultures, when laboratory facilities are available. When grown on artificial culture media, the conidial forms predominate, although old cultures in liquid media or on carrot may show many mycelia.

Treatment: Gentian violet is almost specific and is used in 1 or 2 per cent aqueous solution. The vagina is exposed with a speculum, the accumulated secretion removed with cotton pledgets, and the entire mucosa painted with the dye solution. The surrounding skin also receives a generous application. Treatment may be repeated at intervals of one or two days. In the average case, the application gives almost immediate relief from irritative symptoms, and a few treatments rid the vagina of the fungi.

Our experimental work has proved quite conclusively that this organism is the direct cause of the vaginitis. Direct inoculation with pure cultures has been followed by vaginal and vulval irritation and by an increased discharge within three or four days. Under ordinary circumstances the infection is self-limiting and the vagina becomes clear of organisms within two weeks. It would then seem that special conditions must prevail in the vagina to permit the continued growth of these yeasts, but we have little knowledge of what these conditions may be, except that diabetes and pregnancy make successful accidental or experimental inoculations much easier.

When the infection is present in a pregnant woman at the time of delivery, the child's mouth may become infected and oral thrush may develop. There is no doubt but that certain cases of sporadic thrush appear following this method of contamination. We have been able repeatedly to produce experimental thrush with Monilia cultivated from the vagina. So far, such inoculations have been successful only when the Monilia pinoyi (Castillani) is used, but possibly other forms may be concerned in rare cases of thrush.

The association of Monilia with vulval pruritus in untreated diabetics and its comparative rarity in those who are under effective treatment raises the question of the etiological relationship between the Monilia infection and diabetic pruritus vulvæ. No definite statements can be made at this time, but it seems very probable that the fungus produces the irritation, its growth being favored by the sugar-laden urine.

SUMMARY

Leukorrhea is usually due to infections in the cervix or vagina, only rarely to involvement higher up in the pelvic viscera. In the cervix, endocervicitis represents the most common lesion which is best treated with the fine-wire, electric cautery. Vaginal infections with the Trichomonas vaginalis or with the Monilia group of yeasts may lead to profuse leukorrhea and severe, persistent vaginitis. The former may be treated by a variety of methods, whereas the latter responds well to 1 per cent aqueous gentian violet applied locally.

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WHEN DOES DISEASE BEGIN? CAN THIS BE DETERMINED BY HEALTH EXAMINATION?*

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IT WOULD seem to be easy to speak positively on this subject, but disease may begin in just a few cells and spread quickly or slowly with or without sensation. Fortunately for the patient, but unfortunately for the physician when he is endeavoring to locate the beginning of disease, Nature is able to compensate in various ways for the loss of a quantity of glandular, digestive or absorptive tissue, also of organs of elimination, and, should suffering not ensue, the patient does not realize the deficiency or that he is sick, or that he soon will be appreciably sick. If one kidney is removed the other is able fully to carry on the work; not infrequently there is but one kidney at birth. This is true of all of the double organs, the parathyroid bodies, the suprarenal glands, and so forth. Naturally, this life-saving compensatory effort of Nature's mechanism adds greatly to the problem of medicine. The physician daily sees patients who come for relief of one trouble and who have various symptoms that suggest the possibility of other troubles, and unless a most elaborate series of tests is carried out for at least some of these apparently nonessential conditions, the physician may, and frequently does, miss the beginnings of essential disease. Then the patient again presents himself because of these troubles, when they become a nuisance, in many cases only to be relieved by surgical sacrifice of tissue. Examination must be within reason for the sick, or near-sick, and its extent will be based on the judgment and experience of the physician.

We cannot find out much about slowly developing chronic disease until it is distinctly chronic, which means that there is more or less destruction of tissue or of function, leading the patient to seek relief. However, we do know that in most recurring diseases, and in some chronic diseases, there is a focus if the patient is less than forty years of age, and more than one focus if the patient is more than fifty years of age. We can find out about the acute diseases of childhood, and those which occur after the entrance of organisms with inspired air or with food; some of these organisms are local in effect but sometimes they enter the blood stream and cause general symptoms.

A good many people accept illness as if it were predestined, submitting to it without thought of prevention. The average person has not yet learned the meaning of the term "positive health" and all that it implies in the way of joy of living and efficiency. If we were to adopt the criteria of the public concerning disease, "dis-ease" meaning "parting from ease," there should be some symptom, and the one symptom that all people think of is pain. If there is no discomfort they think there is no disease, unless some accident or injury has taken place, or unless there is some question of muscular trouble; even a growth or tumor may be present without the suspicion of the patient being aroused.

Anything, then, that is a parting from ease leads people to think of disease, and possibly to go to their physicians. If the disease is of their teeth, pain may send them to see their dentists. Yet how many people wait and wait, hoping that the trouble is not serious. Especially is this true of patients who have cancer. Women with a tumor in the breast will put off being examined until it has grown to considerable size or until it gives rise to other symptoms, and then it may be too late, the cancer cells have spread into the lymphatics and have localized in other regions. Adenomas, adenofibromas, or localized mastitis may be the beginning of cancer. When we see patients who have delayed to call on a physician we wonder how much good we are accomplishing by having "Cancer Week" and all the information that is given out in newspapers and by radio concerning prevention of death from this disease. We say to the public "You should come early with cancer," but unfortunately cancer in many situations does not cause symptoms. Only about 2.5 per cent of cancers involve the surface of the body. About 10.5 per cent are in the breast; a little more than 20 per cent involve the genitalia of the male and female, and more than

*Read before the Minnesota State Medical Association, Minneapolis, Minnesota, May 5 and 6, 1931.

a third involve the stomach. Patients with cancer of the colon rarely present themselves until they have a discharge of blood from the bowels or obstructive symptoms from tumor, kink, or narrowing.

After the Wassermann test for syphilis had been discovered, I hoped that some day we might find a test of the blood that would show the presence of cancer, because the majority of cancers are internal and do not give symptoms until they are far advanced. Long since, I gave up the idea that cancer would be discovered early through any blood test, because, in watching postmortem examinations, one finds that many people who have died of pneumonia or all sorts of other troubles have had latent cancer, just as typical cancer as you can get under the microscope. Many of these were of the old Cohnheim type, consisting of a misplacement of tissue, attached to or within the capsule or structure of other organs.

I have some faith in a new test for cancer that is being tried in the west; that is, a chemical test of the urine. It was conceived on the basis that elimination through the kidneys of the waste of abnormal cellular growth might be discovered through appropriate tests. All cells cease to function the moment they become cancerous; nevertheless they have to eliminate something because of their growth, and this is thrown out in the urine. This test has not yet been placed on record. We should experiment along these lines, and from the efforts of many investigators definite results are sure to come.

Tumors of the kidney may attain great size without causing pain or bleeding. Tuberculosis of the kidney may be very far advanced before the patient has the slightest idea that he is sick. Roentgenogram of the lungs tells more in early cases of tuberculosis than does a physical examination. It often reveals all the marks of people of middle age having had tuberculosis long ago. There are the signs of healed processes, even of cavitation, but the process has been stopped for years. I would say that in 50 per cent of these patients you could not elicit any type of history that would give you the period in which the disease first appeared; in fact, many of them cannot remember when they were sick. Thus we have types of disease that do not cause recognized symptoms in their early development. Young people with tuberculosis of the lung might possibly begin to raise sputum, and we find some bacilli of tubercuosis at intervals, but how often the roentgenogram finds evidence of active tuberculosis of the lungs, and yet there are no bacilli in the sputum, or, if bacilli do appear, they are seen only at intervals.

Of 100,000 people today, 160 to 167 die annually from heart disease; it causes sudden deaths, but necropsy reveals that these people had been dying for from ten to twenty years. They had old focal infection and had had round cell infitration in infarctions of the cardiac muscle. When the nerve stimulus from within the heart happens to hit at all points on dead or nonreacting muscle the beat stops, but if one single reacting muscular element had been struck the beat would have been completed, for there was as much working muscle at that time as on the previous day.

The thyroid gland may be lacking at birth, and this gives definite symptoms. Later in life there may be dysfunction such as is seen in exophthalmic goiter, or tumors may develop and be looked on as nuisances, but not as being associated with disease until ill health sends the patients for examination.

Thousands of people have diabetes without realizing it. It may be accidentally discovered, or symptoms may urge them to seek examination. Many of these conditions are out of the realm of early recognition unless persons have physicians whose definite duty it is to look after their health by the year. All of these factors that make recognition of disease uncertain add to the difficulties of the special birthday examination which the medical profession is now urging on the public. They also show how important such examinations will be to both patient and physician.

There is room for more dentists. Just now children are being trained in the care of their teeth. People are discussing for the first time the question of the death of teeth; the conservation of teeth; disease of the jaws; the abscesses that cause no pain because the nerve is dead, a condition that may initiate trouble in any part of the body. They may cause gastric or duodenal ulcers which heal without giving the slightest symptoms, and the scars of which are found at necropsy after death from other causes, or the ulcer may even be active at the time of death without having caused symptoms. The

family cannot give a particle of history that will indicate when the patient had symptoms of ulcer. So there must be latent, silent areas in the stomach that are sometimes the site of ulcers which are painless and which cause no reflex symptoms. Bacteria in diseased teeth may also cause renal stones, or diseases of the eye; Rosenow has reproduced these conditions experimentally in animals. It is probably true that local sympathetic disturbance may precede and may pave the way for the deposit of the bacteria which has been carried through the blood stream.

Patients whom we have watched year after year perhaps appear, all of a sudden, with high blood pressure. We do not know what caused it, and we have to try to find out. We have learned much about the sympathetic nervous system during the last few years. These nerves control activity of function. They control circulation by regulating the size of blood vessels. There is some control of glandular output by hormone or what might be called fluid nerves. A deficiency in the blood may be a stimulus for action. Spasm of the vessels of the leg gives pain, intermittent claudication, continued contractions, gangrene, local and acute vascular contracture, loss of fingers and toes, Raynaud's disease, chronic vascular change, and Buerger's disease. All are essentially changes in blood supply; those of great degree cause gangrene. Recently it has been suggested that the circulation of blood in the brain is also more under the influence of the sympathetic nerves than was formerly supposed, and is probably associated with spasm, sudden or slow mental attacks, and certain types of insanity. We often feel the effect of our food in its secondary effect on the sympathetic nervous system. Ducts are opened and closed by the sympathetic nerves, also by the content of food, and this action of the ducts may be held back by spasm of sympathetic origin. The intestines may become spastic; contractions may result in diverticula, and the outlets from one segment to another may become spastic. The so-called abdominal brain is in the upper part of the abdomen. In this area are the liver, pancreas, spleen, suprarenal glands, kidneys, and the stomach, all subject to many changes through many actions of nerves and hormones. Later in life defects appear in bodily sewage, which increase our discomforts. The toxins and bacterial products of the colon must largely pass to the liver through the portal circulation, but the already injured liver is unable to destroy the bacteria or to neutralize the toxic products. The openings in thick walled capillaries fail to permit the passage of the serum, with food for tissues, which may start the vascular changes later recognized as high blood pressure.

When these early conditions are recognized, what are we going to do about it? Not much. It is a great medical problem. We can now recognize these changes only when they are extensive, or when compensation fails, when, in fact, the marvellous human machine breaks and disease becomes manifest which had existed for a long time. Inherited tendencies to disease become a part of this problem, as does special and acquired immunity against infection, or resistance to cellular degeneration or hyperplasia.

If we are going to have supposedly healthy people come to us to be examined to see if they are healthy, physicians need training and more data. It is unusual today for physicians to see enough apparently normal people so that they can form a basis for recognition of early conditions and of not easily demonstrated minor illnesses. The object of all health education is to change the conduct of individual men, women, and children by teaching them to care for their bodies well, and this instruction should be given throughout the entire period of their educational life.

CASE REPORTS

FATAL REACTION FOLLOWING A TRANSFUSION OF CITRATED BLOOD*

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Fatalities following blood transfusions are infrequent. Blood transfusions are not entirely without danger even though the procedure is carefully controlled. The literature contains several cases of unexplainable death following a blood transfusion. A post-transfusion death should be reported in detail so that the information may be complete and be of value in the investigations of this subject.

A male, aged forty-four years, was admitted to the New Asbury hospital on Dr. R. C. Webb's service on September 11, 1931. The patient was in good health up to midnight of September 9, 1931, when he was in an automobile accident. He was riding in the rear seat of a car and at the time of the accident was thrown forward, striking the back of the front seat with his nose. He began to have hemorrhage from his nose immediately. The nose was packed that night by another physician. Hemorrhage from the nose occurred on September 10 and 11. Nasal tampons in the left nostril controlled the hemorrhage temporarily. There was swelling and ecchymosis over the nose and in both lower eyelids. Crepitation was present when the nasal bone was palpated. X-rays showed a comminuted and slightly depressed fracture of the distal portion of the nasal bone.

After entering the hospital the hemorrhage recurred and Dr. L. R. Boies was called as consultant. The nasal septum was found dislocated along the vomer ridge, with a laceration of the septal mucosa on the left side. Hemorrhage was occurring from a branch of the sphenopalatine artery at the posterior portion of the lacerated area. Posterior nasal packs had to be resorted to in order to control the hemorrhage.

On admission to the hospital his temperature was 97.8 degrees, pulse rate 84, respirations 22, blood pressure 104 systolic, 70 diastolic. The temperature remained normal until September 13, when it ranged from 101.4 degrees to 104 degrees; the pulse being 118 to 132 and respirations around 25. The nasal packs were removed on September 14. A small hemorrhage from the left nostril occurred late that evening. On the morning of September 15 the temperature was 99.6 degrees, pulse 108 and respirations 24. The patient did not have any chills with the increased temperature. Clinical examination of the lungs was normal and the physical examination was negative except for the nasal condition. The patient complained of his head feeling full and on September 13 he was drowsy.

Blood examination on September 14 showed r. b. c. —2,600,000; hemoglobin—61 per cent (Sahli); w. b. c. —29,200; the differential count was 92 per cent p. m. n., 6 per cent lymphocytes, 2 per cent large mononuclears. The patient's blood was in Group II. Urinalysis: light amber in color, specific gravity—1.020, acid reaction, trace of albumin, negative for sugar; microscopic examination of the sediment showed 0 to 2 hyaline casts, 10 to 20 granular casts, 3 to 5 pus cells and 0 to 2 blood cells.

A blood transfusion of 400 cubic centimeters citrated blood was given by gravity at 11:50 o'clock a. m. on September 15, using a donor in Group II. Sixty cubic centimeters of 2 per cent sodium citrate were used. Cross matching of the bloods was performed by Dr. Floyd Grave and Miss Grinager prior to the transfusion and there was no agglutination. The blood transfusion was preceded by 200 cubic centimeters normal saline, which was started at 11:45 o'clock a. m., and 500 cubic centimeters normal salt solution was given following the injection of the blood. The intravenous injection of the normal salt solution was ended at 12:20 o'clock p. m.

Ten minutes later the patient had a chill and at 12:45 o'clock p. m. he became irrational. The breathing became labored. There was no cyanosis and the patient expired at 2:03 o'clock p. m.

A post-mortem examination was performed at 4:35 o'clock p. m. by Dr. J. S. McCartney, the findings being:

1. Fracture of nasal bone;
2. Bronchopenumonia, found by microscopic examination;
3. Sphenoid sinusitis;
4. Cloudy swelling of the liver, kidneys and spleen.

There was no blood clotting in any of the vessels and the urine in the bladder was not blood stained.

A recheck of the matching of the bloods was performed by Miss Grinager and the bloods were found compatible.

The indications for the blood transfusion were to check and control the hemorrhage, to replace the blood loss from the continued hemorrhage and to stimulate the formation of blood elements. The hemorrhage had continued to occur even though it was temporarily controlled by mechanical means. The continued use of the posterior nasal pack seemed to be contraindicated due to the elevation of temperature, which was interpreted as being due to infection caused by intranasal manipulation and the injury.

In this case we are confronted with the question of what rôle the blood transfusion had in producing the

*Presented before the New Asbury Hospital Staff, Minneapolis, October 7, 1931.

fatal outcome. The anatomical findings at the post-mortem examination are those of an infection, namely, the bronchopenumonia and sinusitis following a fractured nose. None of these conditions would be expected to produce the sudden occurrence of death.

Reactions following blood transfusions have occurred since this procedure was instituted. The reactions may be classified as those due to using incompatible bloods, those produced by chemical substances, as anti-coagulants, and a type of reaction in which the etiology is not known and is referred to as allergic or anaphylactoid reactions.

When giving an incompatible blood the reaction occurs after giving a small amount of blood, 20 to 60 cubic centimeters, and is an indication that the transfusion should be discontinued. In 10,242 blood transfusions collected from the literature by Tiber[10] there were thirteen deaths due to the giving of incompatible blood, the total number of deaths being 22. Grouping of the blood was the method used in determining the compatibility of the bloods in the majority of the cases. This is considered sufficient by many of the writers.[1,2,3,10]

The existence of subgroups within the four major blood groups has been worked out by Guthrie and Huck.[6] When grouping is the only pre-transfusion laboratory work that is done, incompatibility of the bloods in the same group between the recipient and donor will not be detected. The use of a universal donor is advocated by Brines,[2,3] as the incidence of post-transfusion reactions is less when using Group IV donors regardless of what group the recipient is in. It has been noted that the greatest number of reactions occur when donor and recipient belong to Group II. To avoid the using of incompatible bloods, preliminary cross matching will detect the presence of incompatibility within the same group. The blood grouping of an individual remains the same throughout life.

Reactions following the different methods of blood transfusions vary. Citrated blood for transfusion developed by Lewisohn in 1915 has been used more than any other method up to date. Reactions following this method have been reported as occurring in from 10 per cent to 64 per cent[4] of the transfusions. The majority of writers report around 45 per cent. With the development of technic for the transfusion of whole blood, the post-transfusion reactions have been reduced to about 15 per cent.[4,7] In studying this question, a direct action of the sodium citrate on the red cells which promoted hemolysis was found by Drinker and Brittingham.[5]

Fatal reactions following blood transfusions in which the cause is not determinable are about .05 per cent.[2] These reactions have occurred as frequently after one method of transfusion as the other. Brines,[3] using the Unger technic, had two fatalities, one in which the donor and recipient were in Group II and in the other case the donor and recipient were in Group IV. In the second case cross agglutination was done and the findings at autopsy were negative. Using whole blood for the transfusions and having the preliminary hemolysis and agglutination tests negative, Percy[9] reports two cases of fatal hemolysis.

Using citrated blood, with the donor and the recipient in Group II, Witts[11] reports a fatality, where the cross agglutination was negative.

Anuria following a blood transfusion sometimes proves to be a serious complication. It was shown by the experimental work of Baker and Dobbs[11] that the anuria was produced by the obstruction of the renal tubules with the precipitation of blood pigment. The precipitation of the hemoglobin occurred in an acid reaction. The hemoglobin is kept in solution when the urine is alkaline and a hemoglobinuria results but a urinary suppression is avoided. It is suggested that an alkaline diuresis be established preceding a blood transfusion as a prophylactic measure.

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A CASE PRESENTING UNUSUAL UROLOGIC DIAGNOSTIC DIFFICULTIES*

JOHN L. CRENSHAW, M.D.
Rochester, Minnesota

A man, aged twenty-seven years, registered at The Mayo Clinic April 10, 1931. In July, 1930, the patient had noticed a bad odor to the urine. He was given medicine by mouth without improvement. A month later while riding in an automobile he felt pain low in the back, as though someone had stuck a knife in his back. This lasted for about three hours and has not recurred. His physician advised him to stop work, which he did, although up to the time of registration he has felt as though he could work. Four months before his admission, pus was found in the urine; this continued to be present. There was no hematuria. Occasionally a stinging, gripping urethral pain occurred for a minute after urination. The stream was of good size and force, although force was needed to expel it; if it was not forced there was dribbling and pain. At times he voided fairly clear urine and in five to ten minutes, after exertion or stool, passed several ounces of thick, stinking pus. He passed urine one to two

*From the section on Urology, The Mayo Clinic, Rochester, Minnesota. Read before the Southern Minnesota Medical Association, Faribault, Minnesota, August 24, 1931.

times at night. In July and August he had had a few chills and had had a little fever occasionally. Eight years before he came to the clinic, and even before that, he had had frequent epistaxis. His appetite was poor. Four years before examination, while walking on the street he suddenly lost consciousness for ten minutes. In September, 1930, while in a hot room he felt dizzy and nauseated, and went outside to vomit. The attack lasted twenty minutes. He has slept well.

The patient's weight was normal, 170 pounds. Systolic blood pressure was 125 and the diastolic 95 in millimeters of mercury. The pulse was 90 and the temperature 99° F. at 5 p. m. The results of general examination were negative. There was no resistance or tenderness anywhere over the abdomen or in the region of the prostate gland or kidney. On rectal examination the prostate gland was found to be enlarged graded 2, and soft and boggy. The tonsils were enlarged graded 3 and contained plugs. Pyorrhea graded 1 was present; this needed local attention only. The concentration of urea was 18 mg. in each 100 c.c. of blood. Combined excretion after intravenous injection of phenolsulphonphthalein was 60 per cent in two hours. The urine was normal in amount and the specific gravity was 1.023; it was alkaline, contained a trace of albumin, erythrocytes graded 2, and pus graded 4, but no sugar was present. Both glasses of a two glass test of the urine also showed pus graded 4. Stains of the urine for the bacillus of tuberculosis were negative. Examination of the blood, the Wassermann reaction of the blood, roentgenograms of the thorax and of the colon and urinary tract, all were negative.

Cystoscopic examination disclosed chronic cicatricial and granular urethritis graded 3 with purulent secretion graded 3 from the prostatic ducts. There was no residual urine and nothing to suggest a neurogenic disorder of the bladder. Irritability was marked, and foul, purulent cystitis with bullous edema graded 3 across the base, particularly on the left side, made it impossible to see either meatus. A cystogram showed the outline of a normal bladder without diverticulum or trabeculation.

A diagnosis was made of marked cystitis with bullous edema of the base of the bladder which was suggestive of an extravesical lesion on the left side, moderate chronic prostatitis and seminal vesiculitis with purulent secretion from the prostatic ducts, and secondary chronic urethritis. The possibilities considered at this time were: (1) prostatic or seminal vesicular abscess draining through the urinary tract; (2) vesico-intestinal fistula; (3) diverticulum of the bladder; and (4) pyonephrosis.

After prolonged irrigation of the bladder a second cystoscopic examination was made. The cystitis had improved although considerable edema remained in the left base of the bladder. Both ureteral meatuses were normal, and intravenous injection of indigo carmine returned in four minutes from both sides was of normal concentration. The left ureter was catheterized and normal urine was obtained. A left pyelo-ureterogram showed normal pelvis and ureter. Several days later an intravenous urogram was made to exclude the possibility of a second pelvis on the left, but this showed only the one normal sized pelvis on that side. The patient in the meantime was showing increasing evidences of sepsis. What, then, was the source of the pyuria?

On close observation the pyelogram of the left pelvis

Fig. 1. Outward and downward displacement of the left pelvis.

(Fig. 1), although normal in outline, was found to be displaced outward and downward and did not seem to compensate in size for the large, soft tissue outline of the left kidney. Therefore a diagnosis was made of complete duplication of the pelvis of the left kidney, the lower pelvis being normal, and the upper, pyonephrotic and functionless; the ureteral orifice from the upper segment was lost in the marked bullous edema of the left base of the bladder.

Exploration of the left kidney May 25, 1931, disclosed complete duplication of the left renal pelvis and ureter and pyonephrosis of the upper part of the pelvis. Heminephrectomy was performed.

CONCLUSIONS

In obscure urologic conditions one must bear in mind: (1) the possibility of an anomaly and also the possibility, if the kidney is concerned, of one of its segments being functionless and therefore not outlined in an intravenous urogram and not giving a return of dye; (2) a comparison of the size of the pelvic outline with the size of the soft shadow of the kidney is often suggestive of a second pelvis being present; and (3) pyonephrosis may be present in spite of the complete absence of pain or tenderness in the region of the kidney.

ACUTE VASOSPASTIC HYPERTENSIVE DISEASE WITH TRANSITION INTO MALIGNANT HYPERTENSION

REPORT OF CASE

CHARLES KOENIGSBERGER, M.D., *Mankato*
and
E. G. BANNICK, M.D., *Rochester*

REPORT OF DR. KOENIGSBERGER

During the 1930 meeting of the Southern Minnesota Medical Association, Dr. Edwin Bannick and I reported an unusual case of hypertension. Certain developments in this case since our report are of sufficient interest to bring to your attention at this time. I will briefly summarize our report of last year, together with a few remarks concerning the progress of the patient since that time, and Dr. Bannick will conclude with a report of his examination made within the past few weeks.

This patient came to me in February, 1930. His age was 29 years. About two months before, he had had a severe attack of septic sore throat. During convalescence a tonsillectomy was done by his local physician. A few days after this he commenced having very severe upper abdominal colic, so severe that his physician considered biliary or renal colic. When he came to us we hospitalized him for observation and treatment. At this time the striking objective data were a vascular tension of 180/140 and a rapid heart rate with a gallop rhythm. The heart was not demonstrably enlarged. The vessel at the wrist showed very little, if any, thickening. The retinal vessels showed no sclerosis but some reduction in the caliber of the arteries. There was no retinitis. The urine and blood were normal, as were the routine tests of renal function.

During his stay in the hospital he had repeated attacks of three different types of pain:

1. Abdominal: The pain was severe, cramping in type, and unaccompanied by fever, vomiting, or physical signs of visceral disease.

2. Cerebral: The pain was that of a generalized, very severe headache.

3. Coronary: The pain was that of a typical attack of angina pectoris. Hypodermic administration of a quarter of a grain of morphine with one-hundredth of a grain of nitroglycerine invariably produced immediate relief. The use of nitroglycerine alone caused immediate cessation of pain, but the relief was very transitory unless the drug was combined with morphine.

The kidneys at no time gave trouble. The intake and output balanced well, and there was at no time evidence of any glomerulonephritis.

The eye-grounds also remained clear of exudates or hemorrhages. The heart gave a great deal of trouble symptomatically. Anginal attacks of extreme severity continued almost daily for about five weeks.

During his entire illness, the blood pressure remained systolic 150 to 180 and diastolic 110 to 140, and on April 26, when I last saw him in the office, the reading was 170/120.

This, then, is a case of acute diffuse vasopastic disease following a streptococcic throat infection characterized by striking involvement of the splanchnic, cerebral, and cardiac vessels.

From the first I considered the existence of malignant hypertension, but the lack of retinal findings or renal insufficiency precluded this diagnosis.

During April, 1931, a little more than a year later than the time covered by our report, I saw this patient again. At this time he was apparently in relatively good condition. He had gained about 40 pounds in weight and felt, in general, fairly well. He had very little headache or pain of any sort. He did, however, have a little pain around the heart on exertion. He was able to walk four or five miles slowly without special fatigue. Physical examination was about as before although the blood pressure was 200/150, the artery in the wrist showed a little more thickening, and the urine contained some albumin with a few hyalin and leukocytic casts but no blood. The examination of the retina showed irregularity of the lumen of the arteries. Notching was present, but there were no hemorrhages or exudate. The blood chemistry was normal; an electrocardiogram showed no significant changes.

At this time Dr. Bannick said to me that he would like to see this patient; I, therefore, asked that he report to Dr. Bannick, which he did about three months later. Dr. Bannick will report his findings at that time.

REPORT OF DR. BANNICK

The case presented by Dr. Koenigsberger is the most unusual example of acute vasospastic hypertensive disease that I have ever seen. I have never seen a case in which the symptoms were so severe, nor could I find a record of one in the literature. The acute hypertension associated with toxemia of pregnancy is similar in many ways, but the extremely severe abdominal cramps, and the terrific angina pectoris are practically unheard of among patients as young as this man. The diagnosis, therefore, was correctly made, not from personal experience or from study of the literature, but by exclusion. Since then, the patient has developed classical malignant hypertension with associated renal injury, all of which merits further interest and consideration.

When I first saw him, in consultation, February 21, 1930, he was in a critical condition. Nephritis was easily excluded by the persistently normal urine, by the normal results from tests of renal function, and by the absence of edema and anemia. That the hypertensive phenomenon was acute was suggested by the history and the facts that the heart was not enlarged, there was no retinitis, and no demonstrable arteriosclerosis either in the radial or retinal vessels. A diagnosis was made of acute vasospastic hypertensive disease, and treatment was given accordingly. The ultimate prognosis was guarded and the immediate prog-

*Presented before the annual meeting of the Southern Minnesota Medical Association, Faribault, Minnesota, August 24, 1931.

nosis was grave, although the patient's relatives were assured that, if the vasospasm could be relieved, at least temporary recovery might take place. As Dr. Koenigsberger has noted, after several weeks of rather

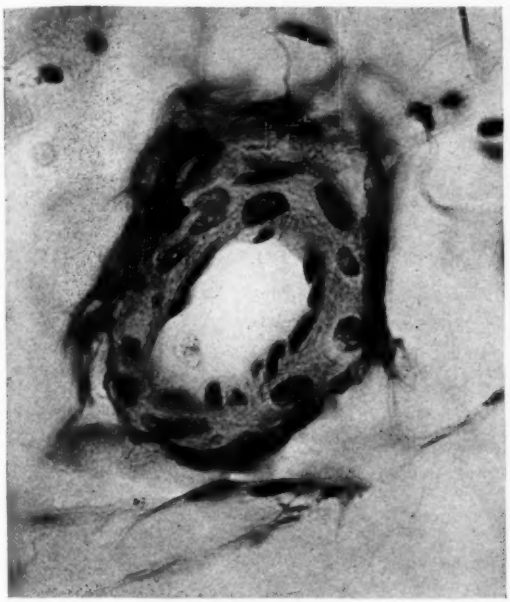


Fig. 1.

severe symptoms the acute crises subsided, and the patient was dismissed from the hospital. The biopsy of the pectoral muscle done shortly after this for study of the arterioles disclosed a normal ratio of wall to lumen; the diameter of the lumen was approximately twice the thickness of the wall, and at first glance the arterioles seemed normal. Closer analysis revealed some increase in the nuclei in both intima and media and suggested that a reaction of some sort was going on in the wall of the vessel, but the arteriolar study definitely confirmed the previous impression that the hypertensive phenomenon was not of long standing (Fig. 1).

Dr. Koenigsberger reported that about a year later, or five months ago, the patient's condition had not changed much, although there were some signs of arteriosclerosis and increasing hypertension with some albuminuria, but when the patient reported at the Clinic on July 27, 1931, a considerable change in the findings was noted. Albuminuria was graded 2 to 3; the urine did not contain blood, but a few casts were seen. Excretion of phenolsulphonephthalein was 45 per cent in two hours. There was no anemia. The concentration of urea was 20 mg. in each 100 c.c. of blood, and of sulphates 6.03 mg. in each 100 c.c. of serum. Blood pressure was 225 systolic and 160 diastolic, and a record of the blood pressure for twenty-four hours showed that it stayed persistently high even at rest. The patient's heart was now definitely enlarged (graded 1 to

ACUTE VASOSPASTIC HYPERTENSIVE DISEASE
(Transition into Typical Malignant Hypertension)
Male—Age twenty-nine years
OBJECTIVE DATA

Dates	Urine				Blood				Heart			Arteriosclerosis		Retinitis	Muscle Biopsy (Arteriolar Study)
	Albumin (grade)	Blood (grade)	Casts (grade)	Phenol-sulphone-phthalein % —2 hours	Anemia	Urea Mgm. %	Serum Sulphates Mgm. %	Blood Pressure Mm. mercury	Hypertrophy (grade)	Significant E.C.G. changes	Gallop Rhythm	Radial (grade)	Retinal (grade)		
Jan., 1930															
2-21-30	0	0	0	Normal	0	Normal		S180 D140	0	Yes	Yes	0	0 some slight constriction	0	
4-26-30	0	0	0					S170 D120				0	0	0	Normal wall to lumen ratio. Some proliferation of both intimal and medial nuclei.
Apr., 1931	Some	0	Some		0	Normal		S200 D150				I to II	I to II	0	
7-29-31	II to III	0	0 to I	45%	0	20	6.03	S225 D160	I to II	Yes	Yes	III	II to III	Typical malignant hypertension	Wall to lumen ratio 1:1. Marked increase in intimal and medial nuclei. Some arterioles completely closed—proliferation.

Severe streptococcic sore throat—followed by tonsillectomy.

2). In the electrocardiogram, among incidental findings was evidence of marked left ventricular preponderance, and a diphasic T wave in Lead I; gallop rhythm was still present. Considerable arteriosclerosis was now easily demonstrated, graded about 3 in the radial arteries and graded 2 to 3 in the retinal vessels. There was a type of retinitis typical of malignant hypertension with bilateral edema of the disks, sclerosis of the vessels, and exudates and hemorrhages. The albuminuria, the slight reduction in excretion of phenolsulphonephthalein, and the slight but definite elevation in the concentration of serum sulphates at this time suggested definite renal involvement and early renal insufficiency. The great disproportion between these renal findings, and the marked evidence of hypertensive and vascular disease, suggested strongly that the renal insufficiency was the result of arteriolar disease and vasospasm, and not of glomerulonephritis.

This is all the more convincing when note is taken of the repeatedly negative urinary findings in the presence of increasing cardiovascular and hypertensive disease. Another biopsy was obtained of the pectoral muscle at this time for further arteriolar study and for comparison with the previous biopsy. In this specimen, too, striking changes were seen. The ratio of wall to lumen now was as 1 to 1, showing that the thickness of the wall of the arterioles was practically twice that seen at the previous biopsy. There was marked increase in the number of nuclei in the intima and media (Fig. 2), and some of the arterioles were completely closed, apparently by intimal proliferation (Fig. 3). A diagnosis was made, therefore, of diffuse arteriolar disease, with malignant hypertension and early renal insufficiency, and the prognosis is extremely poor.

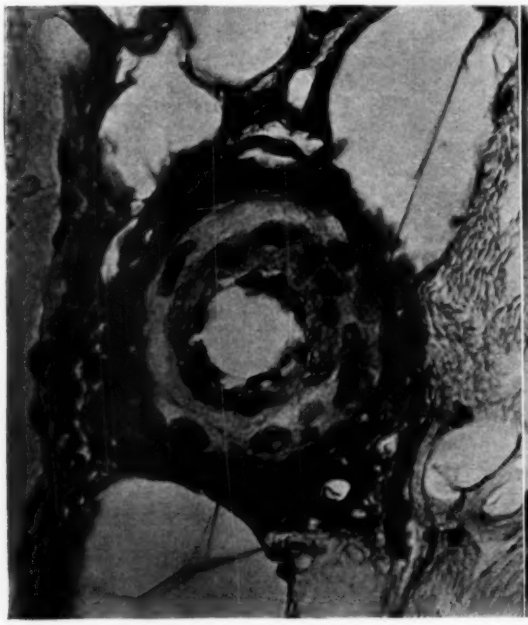


Fig. 2.

Fig. 3.

In conclusion, then: (1) development of malignant hypertension with albuminuria and early renal insufficiency came as a result of arteriolar injury and vasospasm, and not as a result of glomerulonephritis; (2) marked arteriolar involvement was proved by study of biopsy of pectoral muscle; (3) vasospasm was the chief factor at the onset, and preceded demonstrable significant arteriolar disease; (4) the diffuse vasospasm involved arteries as well as arterioles, as suggested by the angina pectoris and abdominal crises, although my impression is that angina pectoris in cases like this is not all due to coronary spasm but also to acute cardiac strain; and (5) the history of the onset suggests acute streptococcic infection as the chief etiologic factor.

PRESIDENT'S LETTER

IT IS an established custom that the President of the Minnesota State Medical Association write an open letter each month to the members for publication in MINNESOTA MEDICINE.

In this, my first letter, I want to thank the profession of the State from the bottom of my heart for the honor bestowed upon me. Born in this state and living amongst you since graduation, my shortcomings must be known to many and I wonder that I have been so signally honored. The medical profession of Minnesota has always been in the vanguard of medical progress, a fact that makes the responsibility of the office greater. My first plea is Doctor Stogge's final plea, that all members read the columns of MINNESOTA MEDICINE closely, not only for its scientific value but for the information it contains concerning the economics of medicine that are looming up so prominently on our horizon.

Our Association is a prosperous, active, and vigorous organization. My efforts will be directed toward holding fast to the present high standards and increasing in any way possible the usefulness of the society to the members. Already plans are well started for the annual meeting this year to be held in Saint Paul, May 23, 24 and 25. Bear these dates in mind and plan to be there for the Committee on Scientific Assembly are preparing a program that will be one no member can afford to miss.

The year 1931 was full of worries, and many problems confront the people of the United States. The medical profession as an integral part of the social and economic structure of the country must share in good times and bad times. The type of medical service rendered the people is second to that of no other nation and has been administered in a democratic and independent manner free of governmental interference—typically American. The medical profession has not only fostered but sought the type of governmental aid that will enhance this service as evidenced by State Boards of Health, State Licensing Boards, the establishment of hospitals for chronic conditions such as poor crippled children, the mentally sick, the blind, deaf and the tuberculous, the burden of which must be borne by the society as a whole.

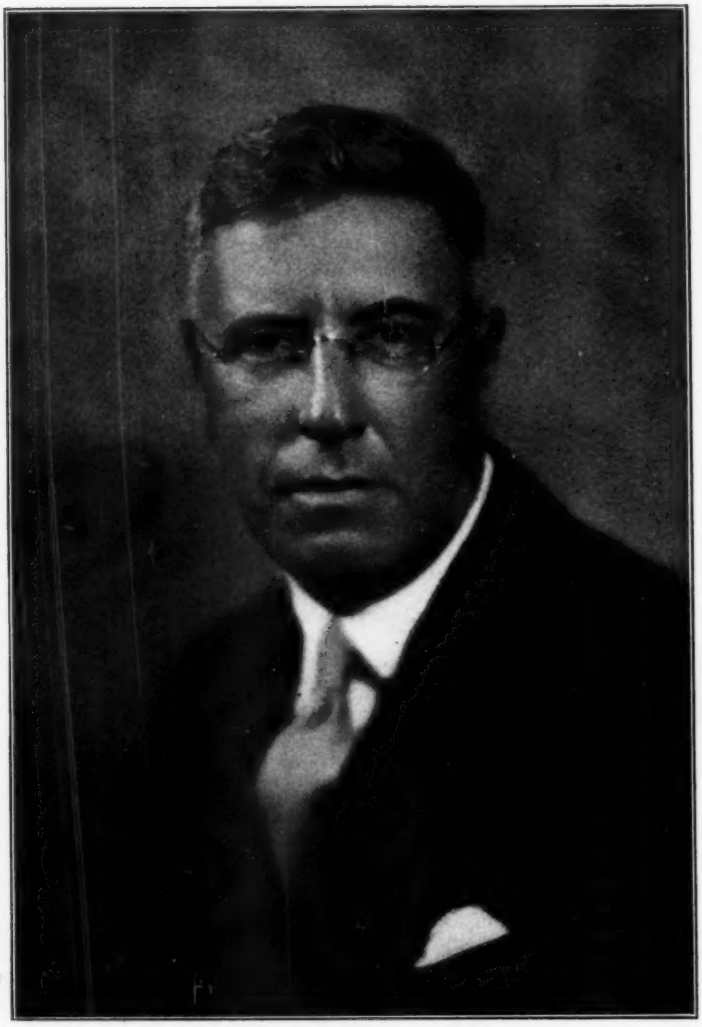
A bureaucracy may start out to be beneficial, but easily becomes questionably beneficial and inefficient. Bureaucratic medicine is sure to lead to an inferior type of medicine when it attempts to take care of the ordinary run of the ills that the general population is subject to.

There is not the slightest doubt in my mind that medicine as it has been and is practiced today in the United Statees is threatened if the plan as outlined by the Veterans' Bureau is carried through to fulfillment. Needless to say, we all want the sick or injured veteran to have the best our country can offer. If the facts were known by the people concerning the high cost of the building, equipping, maintaining these hospitals, and providing care for the patients, they would question the expenditure of the vast sums required. There appear to be ample beds in civilian hospitals to take care of any overflow above the present capacity of the Veterans' Hospitals. It is high time that these facts were known and it is the duty of organized medicine to do its best to aidindisseminating such information. Our profession may be accused of selfish motives but its past record of unselfish devotion toward the eradication of disease and the care of the sick or injured without thought of compensation whenever necessary is adequate answer.

Our taxation system is faulty in that only a small number are made to feel that they are partners in the enterprise of running our country. It looks, however, as though a day of reckoning were at hand. More people must pay direct taxes and consequently will be in a receptive mood for economics. We must not fail to point out forcibly to them the great expense of any such undertaking as that outlined by the Veterans' Bureau and boldly question the type of medical service that will be rendered. Two past presidents of this association are on the recently appointed legislative committee of the American Medical Association, C. B. Wright and Herman Johnson. That committee is gathering information and advocating measures that will be in line with American policies. An editorial entitled, "State Medicine and 4,000,000 Veterans" in the last number of MINNESOTA MEDICINE is well worth reading.

M. A. Henderson.

President,
Minnesota State Medical Association.



MELVIN S. HENDERSON, M.D.
President, Minnesota State Medical Association, 1932

EDITORIAL

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OXYGENATION

The factor of anoxemia in pain production in coronary disease and the sequences in coronary thrombosis and obstruction is now accepted. Barach* has recently discussed the favorable influence upon certain congestive types of myocardial failure after the prolonged inhalation of an atmosphere containing 35 to 45 per cent of oxygen. The scant elevation of 3 to 5 per cent in arterial oxygen saturation seems to account for the patient's enhanced comfort, freedom from pain and protracted dyspnea and an increase of the carbon dioxid in the blood. In like manner, it appears that sloughs and ulcers in thrombotic varicosities are strikingly healed by McPheeters' method, whereby with the application of rubber sponges, with suitable bandages, the patient's muscular effort in walking brings oxygenated arterial blood into the areas. Thus, it would seem that normal tissues promptly suffer when deprived of oxygen and die if the lack is prolonged. Oxygen is needed for energy development and waste disposal.

In terms of this outlook, physicians should observe the basis of the work done by Professor Otto Warburg, which has given him this year the Nobel Prize in Medicine. His studies of blood ferments and oxygen conveyance, as well as the tracing of the events in plant cell photochemical synthesis, have drawn attention to his exactitude in measurements and an attempt to link up biology with the newer physics, even as chemistry has been absorbed by it. His work has further led him into a study of the relationship of oxygen to the metabolism of malignant or cancer cells. He has shown that, like anaërobic bacteria, they can live without oxygen, securing their pabulum from sugar destruction. From this no one draws the conclusion, on account of this common attribute, that cancer may have a bacterial origin; rather does this fact suggest that both bacteria and cancer cells are primitive entities. It recalls the interesting popular writings of Haldane, where in terms of circulation and oxygen availability he explained the limitations of such varied organisms as beetles and elephants, establishing the rôle of oxygen availability in determining both the physiologic capacity and morphologic attributes.

E. L. T.

*Barach, Alvan L.: Therapeutic Use of Oxygen in Heart Disease. Annals of Internal Medicine, October, 1931, 5:428.

THE LEGION'S ATTITUDE TO THE SHOULDERS RESOLUTION

We are reproducing an editorial which appeared in the December number of an American Legion publication known as the *"Forty and Eighter"*:

THE LEGION DIFFERS WITH THE DOCTOR

The American Medical Association has opened fire on the Legion hospitalization program for disabled vet-

erans. In opposition to the Legion plan for giving all disabled veterans needed hospital treatment in government hospitals, the Association, through its *Bulletin*, suggests a plan for disability and hospital insurance for veterans with which they could pay for private treatment in civilian hospitals. Study of this plan shows that it would be much more costly to the government and the results for the veterans in all probability would be less satisfactory.

The average cost of caring for a veteran in a government hospital is $3.84 per day, according to Watson B. Miller, chairman of the Legion's National Rehabilitation Committee, while the average cost of caring for a veteran in a civilian hospital under contract is $4.59 per day, or nearly a dollar a day more. In the civilian hospitals many additional charges are made such as for surgeons' and internists' services, nursing, operating room, drugs, etc., making the actual per diem cost very much more than in government hospitals.

All Veterans' Bureau Hospitals are approved by the American College of Surgeons, which means that the practice of medicine in these hospitals is according to the standards set up by this body. This fact does not apply to all civilian hospitals. Very few Neuropsychiatric and Tuberculosis hospitals are approved by the American College of Surgeons. This is very important because so many of the disabled veterans are being hospitalized for tuberculosis and neuropsychiatric diseases. Where would these men go for proper care if the government hospitals were not open to them?

Civilian hospitals from many standpoints are not in position to care for disabled veterans as economically or as effectively as government hospitals. The Legion must continue to differ with the opinion of the American Medical Association as expressed in its *Bulletin* and continue to support the Legion program of hospitalization for all disabled veterans in government hospitals.

This expresses the opinion of certain members of the Legion regarding the change in the method of hospitalization of war veterans as embodied in the Shoulders Resolution.* That there would not be a unanimous acceptance by the Legion of this change in policy was a foregone conclusion. As a matter of fact, however, many Legion Posts, after having the all around advantages of the change explained to the members, have approved the proposal. If the majority of the Posts favor the change, Congress is more than likely to accede to the Legion's wishes.

If Secretary Mellon's proposed increase in Federal income tax becomes effective there will be a lot more taxpayers interested in governmental economy in the future. Comparative figures as to per diem cost in government and private hospitals are not available. Most private hospitals have more or less endowment in the form at least of buildings and equipment and are not run at a profit so that it does not seem likely that the government can furnish the same hospital care for a less per diem cost. The important consideration from an economy standpoint is that the present program of the Veterans' Bureau will necessitate the construction of many Veterans' hospitals to provide the necessary hundred thousand additional beds. This is obviously a much more expensive program than utilizing the already existing private hospitals.

There are plenty of private hospitals which have received the approval of the American College of Surgeons, if the Legion wishes to limit the care of veterans to approved institutions.

It is true that there are not sufficient beds in private tuberculosis and neuropsychiatric hospitals to care for veterans thus afflicted. Most individuals needing such care are at present provided for at public expense by the individual states. If the veterans prefer federal to state care for such of their number as need it, this should make no difference to the taxpayers.

The Shoulders plan does not propose a remedy to meet a situation affecting the medical profession alone. There is in fact no provision in the Shoulders plan for remuneration of the doctor by the government. Each community has funds invested in its hospitals. Are new government hospitals to be built to the detriment of these community institutions? How are the taxpayers going to react to such extravagance? This matter is a vital one for many so-called private hospitals.

From the standpoint of the professional service secured by the veteran, will he voluntarily choose an unknown government doctor instead of the private doctor he knows personally or by reputation?

There is evidently a minority in the Legion bent on convincing the others that government care is superior to care in private rospitals under private physicians. Members of the medical profession should be interested in this most important problem so threatening to private practice. Many doctors are members of their local Legion Posts and can exert an influence locally in favor of a change so important not only for the veteran but for medical practice, hospitals and the taxpayer.

*Full information regarding the Shoulders Resolution is contained in the *A. M. A. Bulletin* for October, 1931.

MERCIFUL MURDER

A Danish woman deliberately gives her mother an overdose of medicine and kills her. The mother and daughter both believed the painful illness incurable, the mother had failed in an attempt at suicide and the daughter, to save her mother from the penalty of suicide in the next world, took upon herself the duties of judge, jury and executioner. And then it developed that the mother's affliction was gallstones and presumably could have been cured.

Such loose thinking, in the guise of advanced thought, should probably be ignored. This is, however, not the first reported instance of the kind. We are reminded of the surgeon son in the English novel "Sorrel and Son" who similarly assisted his father, suffering from an incurable cancer, out of this world as an act of mercy. It is difficult to judge the motive of an author in apparently approving such an act. We suspect sensationalism. Certainly an overemphasis was placed on an emotional reaction rather than straight thinking.

If a daughter has a moral right to put her mother out of misery, a mother has the same right with respect to her mentally deficient or crippled child. The state should also have the same moral right to execute idiots and the feeble-minded as well as criminals. While such a procedure would be an easy solution of a serious economic problem, it certainly would not meet the approval of an enlightened civilization.

The physician only too frequently encounters a patient for whom death would seem a blessing for all concerned. The judgment of any individual or group of human beings, however, is not infallible. Not rarely is the diagnosis of the best medical minds wrong. The supposedly permanently insane person recovers his sanity, the apparently non-viable newborn babe decides to live and eventually proves to be a genius, the incurable cancer patient lives many years to die of another malady.

Who would be eager to seek the services of a physician who might consider it his moral right to dispatch him to eternity if the diagnosis justified?

It seems to be ofttimes forgotten that pain can be largely relieved and nature is frequently capable of performing seeming miracles. We know something about the prevention and cure of conditions that so frequently make life unbearable. Much has to be learned, however, particularly in this field of prevention, before it can be applied. In the meantime the problem must be met with the present methods without resort to murder.

MEDICAL CARE OF THE POOR

At the Secretaries Conference January 23, 1932, we plan to have a symposium on "Medical Care of the Poor." This subject has created a good deal of interest throughout the State and, of course, has acquired added importance on account of the present depression. Doctors in many parts of the State are finding that their present relations with the various boards of County Commissioners are unsatisfactory. Some counties are making arrangements similar to those that have been made in Iowa, and some have been using a plan similar to that used in Polk County, Wisconsin.

We are planning to have a discussion as to the availability of these and other plans in Minnesota. In order that you may know the present law in Minnesota as a basis for your discussions, the extracts printed below are published. Please read them carefully and discuss them with the secretary of your county society so that he may come to the Conference with some definite ideas.

Mason's Statutes—Minn. 1927—3174—*Board to Appoint Physician.*—The board shall appoint one or more practicing physicians to be physicians of the poor who shall hold office during the pleasure of the board, and receive such compensation as it may from time to time determine. If more than one be appointed, the order of appointment shall prescribe the district in which each shall act, and none shall be required to act outside of his district except in case of urgency. When directed by a member of the board or by the overseer, such physician shall attend upon and prescribe for any sick poor person in charge of the overseer, and also on written direction of a member of the board shall attend upon and prescribe for any sick poor person who is entitled to receive support or relief from the county. If immediate treatment of any person who has been declared a county charge be required, any licensed physician who may prescribe for or treat him before the arrival of the county physician shall be paid therefor. He shall at once notify the county physician who shall thereupon take charge of the case. Within thirty days thereafter, he shall file with the auditor a verified report, showing the name and residence of the patient, the day and hour when called, the distance traveled in going to such place, the nature of the disease or injury, the service performed, the time when the county physician was notified and took charge, and the amount claimed as compensation. The auditor

shall present such report at the next meeting of the board, which shall allow reasonable compensation.

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Minn. Reports—Vol. 25, P. 259. 9/20/78.—A contract of employment, made by a single county commissioner with a physician, for professional services to be rendered to a sick pauper entitled to relief from the county of such commissioner, is unauthorized by the provisions of Gen. St. C. 15, and not obligatory on the county.

" . . . . A county commissioner has no authority to employ, upon the credit of his county, a physician not thus appointed (by the board); and if he does, the unauthorized appointment will create no liability against the county. Though the plaintiff in this case may have acted in good faith in relying upon the certificates and the requests therein contained, this furnishes no ground for his claim against the county, for the law imputes to him full knowledge that the officer with whom he dealt had no authority in the premises."

Minn. Reports, Vol. 95, P. 201. June 16, 1905.—Where the town supervisors are required to provide for the care and support of the poor therein, and have no regular physician to attend its paupers, and a pauper suffers from an accident which requires the immediate attention of a surgeon, who renders services to relieve the necessity, he may recover reasonable compensation from the town, although he had not been requested by the authorities to attend the patient.

Committee on State Health Relations.
THEODORE H. SWEETSER, *Chairman.*

OF GENERAL INTEREST

Dr. J. A. Roy was recently elected mayor of Red Lake Falls.

Dr. Morris Greenberg has located at Robbinsdale, Minnesota, where he is doing general practice.

Dr. W. E. Richardson, Pipestone, has moved to Phillip, South Dakota, where he will engage in general practice.

Dr. C. M. Robilliard has been appointed to succeed his father, the late Dr. W. H. Robilliard, as physician to the State School for the Deaf at Faribault.

Dr. C. H. Sherman announces the opening of offices at 720 Lowry Medical Arts Building, Saint Paul, for the practice of surgery.

Dr. A. H. Parks was elected Chief of Staff of Asbury Hospital, Minneapolis, at the recent annual meeting of the staff members.

Dr. J. R. Kuth and Dr. M. H. Tibbets, Duluth, addressed academy members on "X-ray Interpretations of Orthopedic Conditions of the Spine."

Dr. Eskel Erickson, formerly of Garretson, South Dakota, has purchased the practice of Dr. L. N. Casney at Halstad, Minnesota.

The tenth anniversary of the founding of Lymanhurst school for tuberculous children, Minneapolis, was celebrated by a program given at the school Wednesday, December 2.

Dr. Henry L. Ulrich, Minneapolis, was elected president of the Minnesota Society of Internal Medicine at its last meeting in November. Dr. Moses Barron, Minneapolis, was elected secretary-treasurer of the organization.

Dr. Edwin J. Simons of Swanville was awarded the 1931 prize of $250 offered each year by the Minnesota Society of Internal Medicine to the practitioner of medicine in the state who has made the most valuable contribution to medical knowledge. The monograph submitted by Dr. Simons was on primary carcinoma of the lung.

The American Board of Ophthalmic Examinations will hold an examination in New Orleans on Monday, May 9, 1932, at the time of the meeting of the American Medical Association. Application blanks may be secured from the secretary, Dr. William H. Wilder, 122 South Michigan Avenue, Chicago, and should be submitted at least sixty days before the date of examination.

The Minnesota State Medical Association and the Minnesota State Hospital Association will conduct joint 1932 sessions in Saint Paul, May 23 to 25. The meeting, which will mark the seventy-ninth anniversary of the state medical association and the thirty-third of the hospital organization, will be the first time the two groups have convened together. Scientific sessions will be conducted jointly.

At the annual meeting of the Interurban Academy of Medicine, an organization of Superior and Duluth physicians, held Wednesday, November 18, 1931, Dr. V. E. Ekblad, Superior, was elected president for the ensuing year. Dr. Ekblad succeeds Dr. George L. Berdez, Duluth.

Dr. Mario Fischer, Duluth, was named vice-president; Dr. H. A. Sincock, Superior, secretary and treasurer, and Dr. P. S. Rudie, Duluth, censor.

Dr. Harry P. Ritchie, St. Paul, was elected president of the Western Surgical Association at its recent meeting held in Denver. He succeeds Dr. Carl E. Black of Jacksonville, Illinois, who will take Dr. Ritchie's place as recorder. Dr. Clifford W. Collins of Peoria, Illi-

nois, was elected first vice president; Dr. Edward L. Gilcreest, San Francisco, second vice president; and Dr. Frank R. Teachenor, Kansas City, secretary-treasurer. For a number of years Dr. Ritchie was secretary of the organization and when the duties of this office were divided among secretary, treasurer and recorder, Dr. Ritchie became recorder, with supervision of publications.

The American Association for the Study of Goiter again offers an award of $300 for the best essay based upon original research work on any phase of goiter presented at their annual meeting in Hamilton, Ontario, Canada, June 14, 15, and 16, 1932. It is hoped this offer will stimulate valuable research work, especially in regard to the basic cause of goiter.

Competing manuscripts must be in English and in the hands of the Corresponding Secretary, J. R. Young, M.D., Rose Dispensary Bldg., Terre Haute, Indiana, not later than March 15, 1932.

The first award of the 1931 Kansas City, Missouri, meeting was given Dr. Bruce Webster, Presbyterian Hospital, New York City, "Studies in the Etiology and Nature of Simple Goiter as produced Experimentally in Rabbits."

Dr. C. O. Rice, Minneapolis, among others, received honorable mention for his paper on "Life Cycle of the Thyroid Gland in Minnesota."

On the evening of December 17 a complimentary banquet was tendered Dr. John L. Rothrock of Saint Paul at the Minnesota Club by members of the Ramsey County Society. The occasion was prompted by the retirement of Dr. Rothrock from active practice after some forty years devoted to his profession in Saint Paul.

The banquet was ably presided over by Dr. Arnold Schwyzer, and reminiscences and appreciation of the honor guest were expressed by Dr. O. W. Holcomb, president of the Ramsey County Society, Dr. John F. Fulton, Dr. J. T. Christison, and Dr. Henry Longstreet Taylor. Dr. J. C. Litzenberg, of Minneapolis, in behalf of the University, read a communication from the Board of Regents appointing Dr. Rothrock full Professor of Gynecology and Obstetrics at the University Medical School.

Dr. Rothrock responded with a brief sketch of the remarkable development of medical science which has taken place during his medical career.

MINNESOTA STATE BOARD OF MEDICAL EXAMINERS

HOKAH WOMAN FOUND NOT GUILTY ON ABORTION CHARGE

State of Minnesota *vs.* Mae Jackson Mitchell

On Friday, December 11, 1931, after deliberating thirty-four hours, the jury in the District Court of Houston County returned a verdict of not guilty in the case of Mae Jackson Mitchell. The defendant was charged with having performed an abortion on a young married woman from La Crosse, Wisconsin, on or about May 16, 1931. The defendant is a woman about sixty years of age, residing in Houston County for the last twenty-five years. At the trial she testified that she was a practical nurse and a midwife. However, she holds no license to practice any form of healing in the State of Minnesota. Judge Karl Finkelnburg of Winona, Minnesota, who presided at the trial, informed the jury that he was very much disappointed with their verdict; that the evidence was amply conclusive to warrant finding the defendant guilty. At one time the jury stood nine for conviction to three for not guilty.

Judge Finkelnburg is to be commended for the public expression of the Court's opinion in this matter. The case was well and ably tried by Mr. W. E. Flynn, County Attorney of Houston County, Minnesota. Mr. Flynn and Sheriff Arthur C. Brown both are deserving of special thanks for the sincerity of their efforts in the preparation and trial of this case.

The State Board of Medical Examiners are determined to remedy a very bad situation that has existed in Houston County for some time and will take such steps in the future that conditions warrant irrespective of the outcome of this case.

UNLICENSED "SPECIALIST" DECIDES TO LEAVE STATE

"Dr." A. L. Collen, who claims to be from Chicago, and who has been operating in Winona County for the past thirty days, has informed Mr. E. D. Libera, County Attorney of Winona County, that he prefers to leave rather than face a prosecution for violation of the Basic Science Law. Collen claims to be a Doctor of Chemistry. He has been calling on farmers and other people in the vicinity of Winona selling them various preparations for stomach ailments, rheumatism and the like. When first interviewed Collen was very indignant over his being refused permission to operate in this State, his claim being that he was selling a medicinal preparation and could not be prosecuted for doing so. The evidence obtained by the State Board of Medical Examiners indicates that Collen has been holding himself out as a "Doctor" and a "specialist" from Chicago, furnishing preparations for the alleged relief of various ailments.

The Medical Board will appreciate hearing from anyone who has information indicating that Collen is still operating in this State.

THE COST OF PROPRIETARY AND NON-PROPRIETARY DRUGS

A comparison of the prices of drugs sold respectively under protected and non-protected names shows that the cost of the former is far in excess of the price for which the latter are sold. A comparison of the wholesale price of proprietaries compared with the cost of the drugs sold under their non-proprietary name shows that the total cost of one ounce each of these under a protected name is $25.30 while the cost of an ounce each under an unprotected name is but $6.40. The cost of the proprietary name to the consumer is $18.90. (Jour. A. M. A., October 24, 1931, p. 1226.)

A FORUM OF THE COMMITTEE ON PUBLIC HEALTH EDUCATION

They are getting together at last,—the doctors and the legionnaires.

One of the most important events of the year, from the standpoint of physicians and, we think, from the standpoint of veterans, too, was the conference called for Thursday, November 19, in Indianapolis between the committee appointed by the National Commander of the American Legion and the Legislative Committee of the American Medical Association.

These two committees conferred on new plans for care of veterans' disabilities. This care, according to the medical association committee, could be extended more promptly, more efficiently, less expensively—and without any dangerous dislocation of our economic system—through the medium of local civilian physicians and local civilian hospitals.

Four of the eleven men who sat around the Indianapolis Conference table were from Minnesota. They were C. B. Wright, Chairman of the Legislative Committee of the American Medical Association; E. A. Meyerding, State Secretary and a member of the same committee; Mr. Paul Fesler, President of the American Hospital Association and Superintendent of the University Hospital; and Patt Cliff of Ortonville, member of the Executive Committee of the American Legion.

These important conferences will continue at intervals throughout the year. Something of consequence, both to veterans and the medical profession, should develop.

Chairmen of Committees of the State Association should function for the President of the State Association very much as the cabinet functions for the President of the United States. An opportunity for this close advisory relationship is provided in the monthly Committee Chairmen's luncheon. The last meeting held at the University of Minnesota was given over mainly to discussion of the proposed modification of legislation for disabled veterans—this being the most important public question before the medical profession today.

C. B. WRIGHT (at this meeting): "We are accused of selfishness because we are 'trying to divert money now spent for care of veterans in government hospitals into the pockets of private physicians.' I welcome this charge of selfishness. We are not selfish for ourselves but for our profession. We are fighting, indeed, for the very life of the private practice of medicine. Not for ourselves, but for the men who shall come after us."

E. A. MEYERDING: "We shall have our best effect—not by sensational statements for the newspapers—but by individual and collective contacts with the veterans themselves. When the veterans understand our proposal they favor it. We cannot do better at this stage than to talk it over with the American Legion."

MR. PAUL FESLER: "The American Hospital Association has very carefully gone into this matter. There are approximately 1,200,000 beds in the hospitals of the United States at the present time and about 200,000 of them are vacant. The hospital association is prepared now to offer to the government approximately 76,000 first class beds in fully accredited institutions for the use of veteran patients."

"It has always been my contention," writes a distinguished member of the Medical Advisory Council to the Veterans' Bureau, "that government should not build and operate hospitals except to build the necessary additional facilities around existing medical organizations. This, incidentally, is the plan finally adopted by the Canadian government."

The Public Health Committee of the Ramsey County Medical Society presented an extremely important report at the November 30 meeting of the society. Every medical man could have listened with profit.

Obviously this committee has done a tremendous amount of careful research on the subject. Besides conveying a great deal of information, the report was characterized by eminently acute and intelligent interpretations of the general public health situation and its relation to the medical profession of today.

We take this occasion to congratulate the Ramsey County Public Health Committee. Any other medical group that inveigled the committee into repeating the report might consider itself lucky.

Have you noted the attractive series of public health lectures sponsored on three Sunday afternoons between December and March, by the Cleveland Academy of Medicine?

This group is the second in a series on the general subject, "Life in a Strenuous Age." This season's lectures include: "What Science Knows About Cancer," by Elliott C. Cutler, M.D., Western Reserve University; "Why Think About Eating?" by Henry Gerstenberger, M.D., Western Reserve University; and "Fighting Death After Forty," by R. W. Scott, M.D., Western Reserve University and Chief of the Medical Division, City Hospital, Cleveland.

These lectures are made possible through a gift to the Health Education Foundation of the Academy.

The United States Public Health Service comes in for suspicion and distrust now and then on the part of the foes of State Medicine. The following excerpts from an official bulletin of the service prepared by A. J. McLaughlin, M.D., Medical Director of the service, are particularly impressive and important, therefore.

Every practising physician should read this pamphlet entitled "The Medical Profession and the Health Department." It can be had for five cents from the United States Government printing office at Washington, D. C.

"We speak of the organized medical profession," says Dr. McLaughlin, in this pamphlet. "But its organization is little more than provision for periodic meetings for the reading and discussion of papers on scientific subjects. An exaggerated sense of ethics makes many physicians shrink from anything like business organization; yet organization on a business basis, provision for clinic facilities, regulation of fees on a sliding scale basis according to income are absolutely essential if State Medicine is to be prevented."

Again, "I should like to see the medical profession solve its own problem in its own way without outside interference by governmental or any other agencies. Proper organization of county medical societies will make State Medicine impossible, enable the physician to retain his self-respect and preserve that priceless, intimate, confidential relation that should exist between physician and patient."

Could anything in the way of a warning be more direct and forthright? Could it come from a more responsible, a better informed, a more impressive source? Surely in America there is neither official pressure nor economic necessity for any such drastic dislocation as State Medicine. American medical reforms are, indeed, "up to" the County Medical Society.

A GOVERNOR LOOKS AT CHIROPRACTIC

Governor Buck of Delaware has returned to the legislature, without his approval, a bill to create a board of chiropractic examiners and to regulate the practice of chiropractic. His summarization of the reasons for his veto is so clear and terse that it should be read by the legislators and governors of every state that is threatened or already afflicted with this cult. His statement follows:

The purpose of the act, as I understand it, is to legalize the practice of chiropractic in this state. Practitioners of this cult are not recognized now. Do they profess to be doctors in the same sense of the term as is commonly understood to apply to men and women of the medical profession? Insofar as I am able to determine, there is not a recognized medical school in the country that includes in its curriculum a course in chiropractic. This fact in itself seems singularly significant.

Even to the lay mind the idea that all disease of whatever character is due to spinal displacements of a mild sort, and that cures of such ailments as tuberculosis, smallpox, diphtheria, scarlet fever and others can be effected by manipulation and fingering of the spine is preposterous.

Before returning this bill to you I have satisfied myself that the training and education a chiropractor, or drugless healer, needs to practice his art does not fit him properly to advisedly treat the sick, inasmuch as he is not qualified to diagnose ailments nor recognize communicable diseases and to take measures to control them. He is, therefore, an opponent to the department of health.

Wherefore, it seems to me it would be inconsistent for the legislature to appropriate, as it will do, money for the state board of health, which board is trying to eradicate communicable disease, and at the same time legalize the practice of a cult which does not believe in the germ theory of a disease but does teach and believe that such diseases as scarlet fever, etc., are due to a distracted vertebra and the method to prevent and cure such disease is to see that everybody has a normal spine.—*Journal A. M. A.*

FOODS AND FOOD ADVERTISING

Today, advertising of foods, separate from the package container, is not controlled by any food statutes, and indeed is quite free of any efficient control. The writer of advertising of food products, aside from such limited knowledge of foods and nutrition as he may possess, has only a versatile vocabulary and his conscience as guides in dramatizing the virtues of the products he proclaims to the public. Under these conditions, advertising for food products began to approach the tales of Hans Christian Andersen and the brothers Grimm. Into this mass of mingled truth and deception entered the Committee on Foods of the American Medical Association. It is not surprising that its initial steps should have been greeted with apprehension and bitter deprecation by some of the organs of the food industry, of business and of advertising. The Committee on Foods was established to protect the readers of the journals published by the American Medical Association against improper claims made for foods. If the medical profession required such protection, how much more was the protection necessary for the average layman, to whom the same claims were made as were made to physicians. Only those who have been actively associated with the Committee on Foods can realize the vast amount of good already accomplished. (Jour. A. M. A., October 3, 1931, p. 1004.)

MISCELLANEOUS

THE GENESIS OF SOCIAL INSURANCE

EDWARD H. OCHSNER, M.D.
Chicago

(The following article is one of several which will appear simultaneously in other state journals dealing with various phases of Social Insurance. In view of the growth of the idea of governmental responsibility for the medical and economic care of its citizens, the subject is one of prime importance to the American public at large as well as to the medical profession.)

Social Insurance is the hybrid offspring of impracticable sentimentalism and political expediency. It is an epidemic disease first observed in Germany about fifty years ago which has gradually spread and infected a considerable number of the nations of the earth and now has arrived at our very doors. Unless we succeed in establishing a rigorous quarantine of enlightened public opinion, it will surely gain a foothold in this country in the not distant future.

Social Insurance consists of the following subdivisions or parts: Compulsory health insurance, old age pensions, widows' and orphans' pensions, and unemployment pensions or doles. In none of the countries were they all adopted at the same time. Germany adopted compulsory health insurance in 1883, and all of the other forms since that time. Austria adopted compulsory health insurance in 1888; Hunary, in 1891. England adopted old age pensions first and compulsory health insurance in 1911, and the others subsequently. In this country some of the states have adopted old age pensions and some widows' and orphans' pensions, but so far none have adopted compulsory health insurance, for which negative blessing let us raise our voices in thanksgiving.

When the scientific physician is confronted with the problems presented by a new patient, he meets the situation in the following manner: he obtains a complete family and personal history in order to ascertain if possible the causes which have brought about the condition; by his physical examination and laboratory investigations he finds out what variations from the normal have taken place; after all this he is in a position to advise and institute the proper treatment. Let us follow the same course in the study of this problem.

During the late seventies a number of German parlor socialists conceived the idea that the state make itself responsible for the medical care of its workers. The sentiment in favor of compulsory health insurance grew rapidly among the workers, and Bismarck, although expressing serious doubts as to the soundness of such a measure, yet feeling that something had to be done in order to appease the clamor of the proletariat and the alarming growth of socialism, adopted social insurance as a government measure, had a bill drafted and enacted into law.

In England, National Insurance, as it is called there, had a slightly different setting but substantially the same background. In 1910, David Lloyd George in order to strengthen himself politically decided the time for such legislation was opportune. Not being able to speak German, he gathered about himself several interpreters, hied himself to Germany and after interviewing the well paid heads of the German system, and after having been wined and dined and lionized for two weeks or so, he returned to England very enthusiastic about the whole project, had a law drafted, and later secured its passage. In the recent parliamentary election the Liberty party, of which Lloyd George has been the head for many years, elected just four members to Parliament or less than one per cent of the whole number. So while Lloyd George may have saved his political skin by National Insurance in 1911, he certainly lost his hide by it in 1931.

Practically every reform movement attracts to itself a considerable number of well meaning, emotionally impressionable, impractical, irresponsible, very vociferous individuals, and very often a group, usually the very ones who manage the propaganda and who hope to gain some pecuinary benefit from it. Social Insurance is no exception to this general rule.

Some of the common characteristics of reformers is that they want a new law passed for every human ill, and when the law is enacted they either sit back waiting for the millennium to arrive or they rush off looking for new evils to correct by new laws, forgetting to see to it that the law just passed is being properly enforced, and forgetting at all times that all laws must depend for their enforcement, not upon supermen, but upon men often of less than average intelligence and integrity, upon politicians and their henchmen, who are quick to see how these usually unsound and loosely drawn laws can be converted to their own advantage.

(The foregoing is what is actually happening in some of the countries where such laws are in operation, as future installments will show.)

LISTERINE, AN EXAMPLE OF BOTTLED PSYCHOTHERAPY

The odor and taste of thymol with a little of this and that. The formula given on the carton, "Thyme, eucalyptus, baptesia, gaultheria and mentha, of each one part, boric and benzoic acids, twenty-nine parts, ethyl alcohol, two hundred and fifty parts, water to make one thousand parts. Lambert Pharmacal Company," is merely "a formula." The A. M. A. Laboratory found that the following gives a solution practically identical (chemically and bacteriologically) with Listerine: Boric acid 23.4 Gm., benzoic acid 0.4 Gm., alcohol (94%) 280.0 c.c., menthol 0.375 Gm., thymol 0.75 Gm., eucalyptol 0.8 c.c., methyl salicylate 0.1 c.c., baptesia (wild indigo) fluidextract N. F. 10.0 c.c., water to make 1000.0 c.c. What progressive physician would attempt to write such a polypharmaceutical prescription! (Jour. A. M. A., November 14, 1931, p. 1466.)

OBITUARY

Dr. Frank Lee Puffer

1853-1931

The death of Dr. F. L. Puffer of Bird Island occurred in May, 1931. Born in 1853 and receiving his degree from New York Medical College in 1877, he began practice in Beaver Falls in 1878. He was preceded by just two other doctors in Renville County, namey, Dr. H. Schoregge, who came to Henryville in 1870 and Dr. C. S. Knapp who began practice in Cairo in 1871.

To quote from an editorial which appeared in the Olivia Times:

"Dr. Puffer was a true physician, with a proper conception and estimation of the real character of his profession. His doctrine was one of helpfulness to others, and his practice was to give freely of his service to those in need of it regardless of the consequences to him. In speaking at a Kiwanis club luncheon in Olivia about a year ago, Dr. Puffer related some of his most thrilling experiences in early days in this county. On the evening of October 15, 1880, he was called to see a sick patient seventeen miles from Bird Island. After a long ride over the bleak prairie he reached his destination, but shortly afterwards a storm set in, blocking all roads and making travel uncertain and almost impossible. He stayed several days at his patient's home, then started to shovel his way back to town. On the return he made a detour to see another patient, shoveling his way to this home, and from there to Bird Island, and finally reached home on October 22, just one week from the day he started out on the call. This was only one of the many such experiences he related, and during his brief talk his audience had a picture of devotion to duty brought before their minds, of a lone figure making its way across the bleak prairies of Renville county in 1880, pressing on and on, with great bodily suffering and discomfort, but with a devotion to duty that challenged the admiration of all his hearers.

"The passing of those good, old pioneers gives occasion for profound sadness and regret. They were so human, so self-sacrificing and their lives so in keeping with the best aspirations of the human heart, that we feel their loss most keenly. On the other hand, the opportunity for service came to them as it comes nowadays to very few, and in passing they leave to us a record of service, a lesson of devotion to duty, worthy of the pioneers and of lasting benefit to future generations."

Hugh Spaulding Willson

1877-1931

Word has been received of the death in La Jolla, Calif., of Dr. Hugh Spaulding Willson, fifty-five years old, who practiced medicine in Minneapolis from 1913 to 1926 as a member of the firm of Willson, Cabot and Wohlrabe.

Dr. Willson was born in North Dakota in 1877. He was graduated from the school of medicine of the University of Minnesota in 1904. In the World War he served overseas as commanding officer of base hospital number 70. Following his graduation from the University of Minnesota he was connected with the staff of the Mayo Clinic in Rochester for several years. He specialized in internal medicine.

Dr. Willson is survived by his wife, Mary, and his father, who lives in North Dakota.

H. J. Rowe

1848-1931

Dr. H. J. Rowe died Friday, November 20, 1931, at his home in Minneapolis.

Dr. Rowe had been a resident of Minneapolis four years. For many years he was secretary of the North Dakota State Medical Association, and was a grand officer of the North Dakota Odd Fellows and prominent in Masonic work.

Surviving are his wife and two sons, Dr. Paul Rowe of Minot, N. D., and Dr. Arthur Rowe of New York.

Robert H. Harrison

1862-1931

Dr. Robert H. Harrison, Saint Paul, in charge of the government serum plant at South Saint Paul, and for thirty years a resident of Saint Paul, died at his home Sunday, December 13, 1931, after ten weeks' illness.

Dr. Harrison, both a doctor of medicine and a veterinary surgeon, helped to found the veterinary department at Harvard as a young man. Born in New York, March 9, 1862, he attended New York Medical College, and Harvard. In 1898 he entered the government service and since had been stationed at Milwaukee, Eau Claire and South Saint Paul.

His widow and a son, George, of St. Paul, and two sisters, Mrs. Albertine J. Williams of Philadelphia, and Miss Lucie R. Harrison, living in England, survive.

THEELIN

And the Technic of Introduction of New Drugs.—For many years the Council on Pharmacy and Chemistry has fostered certain broad principles governing the introduction of drugs. Often after a drug has shown promise of considerable merit it has been introduced through wrong channels or by misdirected publicity. To safeguard the scientific integrity and academic interests of the Doisy discovery of the crystalline sex hormone, the St. Louis University School of Medicine devised a plan on the basis of precedent which may serve as a guide to others in the introduction of a new medicament. Irrespective of whether or not theelin is found valuable for medical practice, Dr. Doisy and St. Louis University are to be congratulated on taking such precautionary steps, thus placing the introduction and control of the remedy on a high plane. (Jour. A. M. A., November 21, 1931, p. 1541.)

REPORTS AND ANNOUNCEMENTS OF SOCIETIES

MEDICAL BROADCAST FOR THE MONTH

The Minnesota State Medical Association Morning Health Service

The Minnesota State Medical Association broadcasts weekly at 11:15 o'clock every Wednesday morning over Station WCCO, Minneapolis and Saint Paul (810 kilocycles or 370.2 meters).

Speaker: William A. O'Brien, M.D., Associate Professor of Pathology and Preventive Medicine, Medical School, University of Minnesota.

The programs for the month of January will be as follows:

January 6—Personal Hygiene—Physical Activity.

January 13—Causes of Bad Breath.

January 20—Three Score and Ten Approaches.

January 27—Warning Signs of Cancer.

STATE CONFERENCE OF SECRETARIES

Three major discussions will occupy convening secretaries and a large number of out-of-state visitors at the annual Secretaries Conference of the Minnesota State Medical Association to be held Saturday, January 23, at the Saint Paul Hotel.

A symposium on the general subject, "Medical Care of the Poor," will occupy the major part of the morning session. The luncheon meeting will be devoted to a series of talks on the subject, veterans' legislation and contemplated reforms. A symposium on the periodic medical examination will follow in the afternoon.

Mr. H. Van Y. Caldwell, Secretary of the Cleveland Academy of Medicine, is among the important out-of-state speakers who are coming to St. Paul especially to address this conference. Many others who will attend the Northwest Regional Conference on the Sunday following the Secretaries' Conference will also come in time to speak at both meetings. Among them are Mr. Vernon D. Blank, Des Moines, General Manager of the Iowa State Medical Society; Mr. Theodore Wiprud, Milwaukee, Executive Secretary of the Medical Society of the County of Milwaukee; H. M. Camp, M.D., Executive Secretary of the Illinois State Medical Society; Mr. T. A. Hendricks, Executive Secretary of the Indiana State Medical Society; Dr. Otto Feidler, President of the Wisconsin State Medical Association; Mr. George B. Larsen, Secretary of the Polk County Medical Society, Frederic, Wisconsin.

REGIONAL CONFERENCE

The regional conference composed of officers of state medical societies of the Northwest resumed its annual informal conferences last year, after a lapse of several years. Its 1932 program for discussion includes Social Medicine, Contract Practice, The Shoulders Resolution Auxiliary Committee, Lay Education, State Medical Journals, and the Periodic Medical Examination. The states participating in this conference include Minnesota, Wisconsin, Iowa, North and South Dakota, Nebraska and Montana.

FRACTURE SYMPOSIUM

On February 3 and 4, 1932, there will occur in Minneapolis a discussion of the modern treatment of fractures. This is being conducted under the joint auspices of the Minneapolis Regional Sub-Committee of the General Fractures of the American College of Surgeons and the Minneapolis Surgical Society.

On Wednesday evening, February 3, 8 o'clock in the Auditorium of the Hennepin County Medical Society a symposium on the treatment of fractures will be held.

The program on Thursday, February 4, will be entirely under the direction of the Minneapolis Surgical Society in connection with its annual formal meeting. Dr. Kellogg Speed of Chicago, an outstanding authority on the subject of fractures, will be the guest speaker. At 10 o'clock, Thursday morning, Dr. Speed will conduct a fracture clinic with demonstration of cases at the Minneapolis General Hospital. At 3 P. M. he will lecture to the students of the medical school, and following the annual formal banquet of the society in the Nicollet Hotel at 6 P. M. he will deliver an address before the society.

All members of the profession in good standing are invited to attend these meetings, including the banquet.

Reservations for the banquet must be made with the secretary, H. O. McPheeters, At. 5579, before Wednesday noon, February 3, 1932. Banquet tickets are $2.00.

STATE MEDICAL AND HOSPITALS ASSOCIATIONS

For the first time in their history, the Minnesota State Medical Association and the Minnesota State Hospital Association will hold their annual meetings at the same time and under the same roof this year.

The sessions will begin May 23 at the new St. Paul Auditorium and continue through May 25.

This much was definitely decided upon at the first meeting of the Committee on Scientific Assembly December 5, to which officials of the state hospital body were invited.

Ample lecture and clinic rooms for both organizations are available in the new building, now close to completion. Exhibits for both organizations will be assembled in the large new exhibit room of the building. One large general meeting is being arranged tentatively for Monday night, May 23, which will unite both organizations and the Women's Auxiliary to the Medical body. The subject on this occasion will probably be "Veterans Legislation."

Another new feature of the tentative meeting schedule should be of particular interest to Twin City physicians. For the convenience of the latter, all distinguished out-of-state speakers, of whom four or five are now under discussion, will be booked to talk at noonday sessions.

Arrangement of the scientific program by small sections instead of large general sessions is also under consideration by the committee. If present plans materialize there will be fifteen different sessions in the three day program. Only a few of the these, including the noonday sessions, will be general meetings.

The afternoon of the 25th will be devoted exclusively to clinics if present plans of the committee are carried out. If possible, these clinics will be held at the Auditorium itself, where ample room is available, thus avoiding the inconvenience of moving the meeting to the University or the hospitals.

Final selection of speakers and subjects will be determined largely by responses to the questionnaire already sent out to all members of the association.

CHAIRMEN OF COMMITTEES MEETING

A complete report of the results accomplished in the recent meeting of committees from the American Medical Association and the American Legion in Indianapolis chiefly occupied the chairmen of committees of the State Association at their last regular meeting, held at the Minnesota Union at the University, Monday, November 28.

C. B. Wright of Minneapolis, chairman of the Legislative Committee of the American Medical Association, and E. A. Meyerding, St. Paul, Executive Secretary and member of the Auxiliary Committee on Veterans' Affairs, both of whom attended the Indianapolis meeting, spoke.

Mr. Paul Fesler, superintendent of the University Hospital and President of the American Hospital Association, and A. Calvin, Superintendent of Midway Hospital in Saint Paul, were present by invitation to explain the hospital men's attitude on the subject.

A brief report by J. A. Watson, Minneapolis, chairman of the Committee to Coöperate with the Minnesota Editorial Association, on the last meeting of his committee with the editors concluded the program, which ended as agreed upon at 2:00 o'clock promptly.

The next chairmen's meeting was set to coincide with the Secretaries' Conference, January 23, in Saint Paul.

CAMP RELEASE DISTRICT SOCIETY

The annual meeting of the Camp Release District Medical Society was held at Granite Falls, Minnesota, Monday afternoon and evening, November 30, 1931.

Following the business session in the afternoon a Skin Clinic was held under the direction of Dr. W. H. Goeckerman of the Mayo Clinic. Dr. Goeckerman addressed the members on the subject "Eczema and Urticaria."

At 6:30 o'clock a joint dinner with the District Auxiliary was held at the Riverside Hotel. Following the dinner short addresses were given by Dr. L. Sogge, president of the State Medical Association, Windom, Dr. H. M. Workman, District Councilor, Tracy, Minnesota, and Mrs. James Blake, president of the State Auxiliary, Hopkins.

The evening's program consisted of two addresses. Dr. Lewis Jordan, Granite Falls, spoke on "Tuberculosis" with demonstrations of the Mantoux test. Dr. Willard White of Minneapolis spoke on "Some Problems in Treatment of Fractures."

The following officers were elected for the ensuing year: F. W. Penhall, Morton, president; G. H. Mesker, Olivia, vice-president; J. Dordal, Sacred Heart, secretary-treasurer; L. J. Holmberg, Canby, delegate to annual meeting, with M. A. Burns of Milan as alternate.

RICE COUNTY SOCIETY

The annual meeting of the Rice County Medical Society was held in the Faribault Clinic Rooms on Tuesday, November 10, 1931, at 7:45 p. m.

Dr. W. E. Wilson, Northfield, read a paper entitled "A Review of a Poliomyelitis Epidemic." Dr. E. C. Rosenow, Rochester, spoke on "Bacteriologic and Immunologic Studies of Poliomyelitis."

Election of officers for 1932 resulted as follows: President, Dr. J. M. Murdoch, Faribault; vice president, Dr. W. E. Wilson, Northfield; second vice president, Dr. Edmund Backe, Kenyon; secretary-treasurer, Dr. C. J. Plonske, Faribault; delegate to State Meeting, Dr. A. M. Hanson, Faribault; Censors, Dr. F. M. Babcock, Northfield, Drs. M. L. Mayland and S. B. Hessaly, Faribault; Publicity Committee, Drs. F. U. Davis and P. A. Smith, Faribault; Dr. O. P. Thorson, Northfield.

WRIGHT COUNTY SOCIETY

The annual meeting of the Wright County Medical Society was held at Buffalo, Minn., Tuesday, October 6, 1931.

Minutes of the Delano meeting were read and accepted.

A paper on "Diabetes Mellitus" was read by Dr. C. L. Roholt. Dr. E. Klaveness read a paper on "Medical Ethics." Dr. Klaveness' ideas were clearly set forth both from the standpoint of personal opinion and from experience. He is to be congratulated on his courageous expression on such a delicate and unpleasant subject when handled locally.

Election of officers for 1932 resulted as follows: Dr. F. Ellison, Monticello, president; C. L. Roholt, Waverly, vice president; J. J. Catlin, Buffalo, secretary; Oscar Freed, Cokato, delegate to State Meeting; E. Klaveness, Saint Paul, alternate; George Nonis, Annadale, censor for three years.

The Ladies' Auxiliary were entertained by Mrs. J. J. Catlin.

Drs. C. B. Wright and N. Pearce, of Minneapolis, gave a talk on the Various Aspects of Medical Economics, a very interesting and a most timely subject worthy of serious consideration.

C. L. ROHOLT, *Secretary.*

WOMEN'S AUXILIARY
Minnesota State Medical Association

CAMP RELEASE AUXILIARY

The annual business meeting and election of officers of the Women's Auxiliary to Camp Release Medical Society was held at Granite Falls, Monday afternoon, November 30. Mrs. J. S. Kilbride, retiring president, presided at the session. New officers elected are: President, Mrs. R. C. Adams, Bird Island; first vice president, Mrs. J. Dordal, Sacred Heart; second vice president, Mrs. M. A. Burns, Milan; secretary, Mrs. G. H. Mesker, Olivia; treasurer, Mrs. M. S. Nelson, Granite Falls.

Mrs. James Blake, of Hopkins, state president, gave a splendid address on the work of the Auxiliary at the afternoon session.

At 6:30 a joint dinner with the members of the medical society was given at the Keegan hotel. The dinner program included talks by Dr. L. Sogge, Windom, state president of the medical society; Dr. H. M. Workman, Tracy, district councilor; and Mrs. James Blake, state president. A rising vote of thanks was given Mrs. Blake for her inspirational address.

HENNEPIN COUNTY AUXILIARY

The Christmas party of the Woman's Auxiliary to the Hennepin County Medical Society was held on Wednesday, December 16, in the room of the Hennepin County Medical Society. "The Lonesome Christmas Tree" was the subject of a reading by Mrs. E. Z. Wanous. The program, which was arranged by Mrs. C. E. Proshek, included the singing of Christmas carols by a group of Slavic children and Christmas songs by the children from St. Mary's Russian church.

MOWER COUNTY AUXILIARY

The auxiliary of the Mower County Medical Association held an open session Monday, November 30, at the Y. W. C. A. rooms. About fifty women were present. Besides the members who are the wives of Mower County doctors, the presidents of the Parent-Teacher Association were present.

The president, Mrs. A. W. Allen, presided. In an informal way, she told how the organization was formed last April with the following officers, besides herself: Vice president, Mrs. M. W. Morse of Le Roy; sercetary, Mrs. P. A. Lommen; and treasurer, Mrs. G. E. Hertel. Five meetings had been held. The work taken up was sewing for the local hospital.

Mrs. Allen then turned the program over to Mrs. C. C. Allen, who for some time has been especially interested in health work. Aside from musical numbers, the program consisted of reports from the Regional Conference of Health and Social Work which was held at Kasson, November 6. Mesdames A. W. Allen, C. C. Allen, C. L. Sheedy and B. J. Cronwell, were present at that meeting.

RAMSEY COUNTY AUXILIARY

The auxiliary to Ramsey County Medical Society met Monday, December 7. The auxiliary had offered a silver cup to the Saint Paul High School student submitting the best essay on the Christmas seal week.

STATE AUXILIARY

Seventy-five essays on "Today's Fight Against Tuberculosis" were received and the ten best were broadcast over Radio Station WCCO. The woman's auxiliary to the State Medical Society had donated two cups to be given to the two best essayists.

PROCEEDINGS OF THE MINNEAPOLIS SURGICAL SOCIETY

Meeting of November 5, 1931

The regular monthly meeting of the Minneapolis Surgical Society was held in the Lounge on the 20th floor of the Medical Arts Building on Thursday evening, November 5, 1931.

The meeting was called to order at 8 p. m. by the President, Dr. J. Frank Corbett. There were 27 members and 5 visitors present.

The following scientific program was presented.

Dr. A. F. Bratrud reported a case of Lipoma at the Ileocecal Valve Causing Intestinal Obstruction, as follows:

The case presented this evening is that of a woman 67 years of age who was first seen and examined on April 6, 1931. She had been in very good health up to about five years ago, at which time she had some form of operation for removal of a brain cyst. She had pneumonia at 45 years of age and normal menopause at 48 years of age. The family history was negative.

Her present complaint dated back to about October, 1930, at which time she first noticed sharp cramps in the right side of the abdomen, with radiation of pain across the abdomen. She states that it felt as if there was a growth in the abdomen. There had been a gradually increasing weakness, with 20 pounds loss of weight since October 1, 1930. She complained of difficulty in keeping the bowels open. There would be a day or two, at intervals, when the bowels would be rather loose. She has had distention of the abdomen with belching of gas, but no nausea or vomiting. There had been palpitation of the heart at times, and during the previous week she had had dizziness. The dizziness occurred either while lying down or while up and around.

Examination showed a fairly well-nourished and fairy well-developed woman about 67 or 68 years of age. Blood pressure 140/68; temperature 98°; pulse 74. The skin appears as though the patient had lost some weight. There is an area about 1.5 inches in diameter in the mid-parietal region of the cranium where bone has been removed. She had had an occasional cough which is noticeable when she is lying in bed and which seems to cause some distress. The

mouth, ears, nose and neck are normal. There is no adenopathy. The heart is enlarged to the left to the anterior axillary line. There is a systolic murmur heard at the apex ending at the second sound. The breath sounds of the right chest are normal. There is bronchovesicular breathing in the left chest. Slight distention of the abdomen is noticed. There is tenderness and spasm in the right lower quadrant of the abdomen with the suggestion of a mass close to the crest of the ileum. This is not movable. Percussion at the costal margin is negative. Rovsing's sign is negative. Pelvic examination is negative. The reflexes are normal. The urine shows a specific gravity of 1.021, with a trace of albumin, no sugar, and numerous pus cells. The phenolsulphonephthalein test showed a return of 32.5 per cent in two hours. The blood chemistry showed sugar 0.108; urea nitrogen 19.6 mgms. White blood count was 7,200; differential—pmns. 74, lymphos. 21, eos. 4. The hemoglobin on April 8, 1931, was 92 per cent; on May 11, 1931, was 77 per cent.

Electrocardiogram—P-wave broad and flat; R-wave slurred, descent gradual. The tracing does not look exactly normal, but there are no definite changes that would contraindicate operation.

A series of plates and fluoroscopic examination made immediately after a barium meal showed the stomach normal in size, shape and position. There is no deformity of the walls of the stomach and the cap is clean-cut and not deformed. Examination at 6 hours shows the entire meal in the lower ileum.

A barium enema was administered under fluoroscopic control and plates were made. These show a moderate spasm involving the entire colon. There is a localized filling defect of the lower portion of the cecum with a moderate degree of spasm involving the ascending colon. Conclusion: Normal stomach and cap; I believe the findings in the cecum represent a carcinoma.

On April 13, 1931, under spinal anesthesia, a right rectus incision was made in the lower abdomen. There was an indurated nodular mass involving the head of the cecum and about the ileocecal valve, the mass being about the size of a fist. There was an indurated area retrocecal to the cecum ascending up about 4 inches. The cecum was adherent to the right broad ligament. The pelvis was negative; liver negative. A resection and aseptic anastomosis, end-to-side, of the terminal ileum with the transverse colon, was performed. Inversion of the terminal portion of the ileum was performed, leaving the stump of the distal ileum with the cecum still within the abdominal cavity. Closure was made in layers without drainage. The postoperative course was uneventful.

On April 28, 1931, under spinal anesthesia, the old scar was excised, extending the right rectus incision to above the umbilicus. The mass at the head of the cecum was much smaller, being about the size of a medium sized orange. There were no glands posterior to the cecum. There were very few adhesions following the operation two weeks previously. Resection of the cecum, terminal ileum and including the ascending colon and hepatic flexure of the colon was performed. The stump of the transverse colon was inverted and final closure was made with linen with peritonealization of all surfaces. The closure was made in layers without drainage.

Report on specimen removed: Cecum widely resected. The walls are very thick with a tissue closely resembling fat. Walls are an inch thick in places. The lumen of the intestine is small and the mucous membrane fairly regular and smooth. The tissue causing the thickening and obstruction originates from the outer coats of the intestine. There is narrowing and obstruction present.

Section: Great deal of fatty and fibrous tissue. Considerable round cell infiltration of the muscle layers of the intestine. The glands appear normal in size and shape. There is a great number of eosinophiles between the columns of the glands. There is no evidence of malignancy.

The pre-operative treatment in this case consisted principally in high caloric diet with digitalization and sedatives. Ergot was given pre- as well as post-operatively. The post-operative course was uneventful. She was discharged from the hospital on May 17, 1931, with the wound well healed and feeling well. She was last seen and examined on September 5, 1931, feeling extremely well and back to normal weight. At that time she was eating practically all foods and having practically no intestinal disturbance at all.

Comments: It was impossible to determine at the time of operation whether this was a benign or a malignant condition from the appearance of the tumor. On account of the rarity of this type of tumor, it was not even suspected. The origin of this tumor, according to Ewing, is different from that of those reported. This growth arose apparently from the outer coat of the intestine, whereas they usually arise from the submucosa or from appendices epiploicæ of the colon. It is believed that this type of tumor causes more pain or cramps than a malignant condition on account of the location of the tumor. Even with the high hemoglobin, the true nature of the tumor was not suspected.

DISCUSSION

Dr. E. T. Bell (by invitation) stated that he had seen several benign tumors in that location but had never come in contact with a lipoma at that place. The benign tumors of the intestinal tract are rather rare compared with the malignant ones, the more common ones being myomata and benign glandular polyps. But the lipoma is a distinctly rare form of tumor in the intestinal tract. He said that nothing in particular is known about the cause of these tumors.

Dr. J. F. Corbett asked as to the size of this tumor and also whether it was annular.

Dr. Bratrud said that originally the tumor was about the size of a man's fist, but at the time of the second operation it was only about one-half that size. The ileocecal valve even at the second operation seemed to be practically closed.

Dr. McPheeters asked if it felt like carcinoma.

DR. BRATRUD replied that it was impossible to determine what type of tumor it was from the gross appearance. He did not think that it really felt as firm and nodular as a carcinoma in this location should feel. The one thing that made him doubtful about this being a carcinoma was the fact that there were no glands retrocecally.

DR. WILLARD C. PETERSON read his Inaugural Thesis on "Chronic Recurrent Appendicitis."

ABSTRACT

The object of the study is to determine whether there are any characteristic structural changes in the appendix in the so-called chronic appendicitis. The material consists of 100 cases of chronic appendicitis which have been thoroughly studied clinically. Each appendix was sectioned in three places. The author gave a review of the clinical phenomena, the differential diagnosis, pathology and a review of the literature. The classification of the lesions found in this series he made as follows:

1. Clear-cut type of chronic inflammation.
2. Chronic periappendicitis.
3. Patent appendix.
4. Obliterative appendix.
5. Carcinoma, cysts, anomalies, and tuberculosis.
6. Normal.

The author also gave a review of the treatment and post-operative results.

DR. KENNETH BULKLEY gave a lantern slide talk showing the lesions caused in the appendix by parasites —oxyuris vermicularis and trichocephalis dispar—as a possible etiologic factor in appendicitis.

Dr. Bulkley thought that possibly it was unfortunate both for surgeons and for the public that there is so much appendicitis; its very frequency tended to make both groups of individuals belittle its importance. He felt that Dr. Peterson's paper was worth while inasmuch as any study which contributed toward our knowledge of the etiology of this disease was of value. In the last analysis, no one knows anything in regard to the etiology of appendicitis or its prevention except that it seems to be an established fact that a break in the mucosa is probably essential for the development of appendicitis. The only absolute prevention of appendicitis is to remove the normal appendix prior to the onset either of inflammation in it or prior to the onset of symptoms from it. In this connection Dr. Bulkley cited an experience which he had some eighteen years ago in which he assisted a prominent New York surgeon, now dead, in removing four normal appendices from his four normal children who never had had symptoms of appendicitis, these operations being done because of an unfortunate experience with his fifth child who had developed a gangrenous appendix during his absence.

In connection with the etiology of appendicitis, Dr. Bulkley wished to call the attention of the members to the role possibly played by parasites in causing not only definite breaks in the mucosa of the appendix but definite lesions in the wall of the appendix. The parasites most commony at fault were the oxyuris vermicularis or pin-worm or seat-worm and the trichocephalis-dispar or whip-worm. Dr. Bulkley then demonstrated by means of some twenty lantern pictures, a series of microscopic slides showing the lesions caused by both of these parasites from their early penetration through the columnar epithelioma to their eventual death and hyalinization through fibrous encapsulation by the host. Dr. Bulkley called attention to the fact that this subject was largely overlooked chiefly because of the lack of proper technic in the search for these parasites. He called attention to the fact that if their percentage incidence was to be correctly estimated, not only was it necessary to examine microscopically the contents of the appendix but that it often was necessary to make large numbers of serial sections of the appendix walls; that it was only by so doing that he and Dr. R. L. Cecil, with whom this work was originally done some eighteen years ago, had been able to find the lesions demonstrated to the Society tonight.

DISCUSSION (on thesis and lantern slides)

DR. E. T. BELL (by invitation) stated that this form of appendicitis is the only kind which pathologists recognize as chronic appendicitis, and it is chronic in the sense of recurrent acute attacks. As Dr. Peterson pointed out, this is clinically the same as ordinary appendicitis except that the attack is more mild. But there are all degrees of intensity of attacks. Some of these patients have had eight attacks over a period of years. The intense symptoms last several days, then soreness and tenderness continue for possibly several weeks. So far as Dr. Bell had noticed, these are the only kind of attacks these patients have—fairly mild attacks—and he had never seen any which went over into the gangrenous form. He stated that there is nothing known to pathologists as chronic appendicitis in the sense that syphilis or tuberculosis is chronic, but these are just a series of mild acute attacks.

When one operates, the appendix looks normal unless microscopic sections are cut, and for this reason sometimes the surgeon is much embarrassed because he may think he has operated on a normal appendix. But a microscopic section brings out quite clearly an inflammation in the serous layer of the appendix. The typical acute appendicitis starts from the mucosa; then the inflammation spreads out to the serosa. If one could get these cases in the first few hours of the attack it would be possible to find the primary mucosal lesion; but after a day or so it has spread to the whole appendix, the extension to the muscularis and mucosa being secondary. The inflammation is characterized by lymphocytes. It is not an acute process in which one finds polymorphonuclears. It is only on microscopic section that this is shown. In a great many of the cases in which the surgeon may think the appendix is normal, it really is not. Dr. Bell said it is not known whether the appendix is responsible for the

symptoms in cases in which it is normal microscopically.

Then there is the obliterated appendix which is found in some cases, in which there is no lumen in the appendix. He could not feel that that type of appendix could possibly cause symptoms. This latter type of appendix increases in frequency with age; the older the patient is, the more likely is he to have an obliterated appendix.

Then there is the question of fecaliths, which may cause cramps. But a great many of these fecaliths are found in the appendix postmortem in patients who have never had symptoms.

Another form is the type with adhesions about the appendix. Young children have practically no adhesions at this point, but in each decade more and more of them are found, and they are seen in more than half the middle-aged. These are often seen postmortem, and it is difficult to believe that these adhesions are the cause of the symptoms. They might be, but evidence is against it.

Then there is a benign tumor of the appendix which is commonly called carcinoma, but since it is not malignant a better term is "carcinoid." Microscopically it looks malignant but it isn't. It forms a hard button at the end of the appendix but never gets outside the organ. It causes inflammation.

Dr. Bell stated that this chronic appendicitis is a well-defined type of appendicitis in which the appendix looks normal but on microscopic sections one finds inflammation in the serosa.

He was also of the opinion that people who have indefinite abdominal complaints very seldom have appendicitis and the follow-up usually shows they have some other disease. He had seen several cases of renal stone giving the same symptoms, and to cover all these up with the name of "chronic appendicitis" is not helping the surgeon. Dr. Bell said he did not want the members to think he was taking the attitude of criticizing the surgeons for taking out an appendix when they have a clinical picture of appendicitis, for if the surgeon is too conservative he may lose a patient who has a gangrenous appendix. He did want to say that when an appendix is removed and found to be normal histologically, the patient should be thoroughly studied to see if a similar error might be avoided in the future.

He also called attention to the term, very common in French literature, of "perityphlitis," in which there is inflammation around the cecum and appendix, but he had not seen infections of that type. While he had seen quite a lot of inflammation which had spread around the cecum it seemed to be definitely traceable to the appendix.

Then of course there are the parasites in the appendix which may be the cause of appendicitis. The most common of these are the pin worms and thread worms.

Dr. Bell stated that these were very amazing pictures which Dr. Bulkley has shown and while he had had a general idea that worms were the cause of some appendicitis he had seen only two or three such instances. However, he had not studied appendices in serial sections or he might have seen more of them. He said it was difficult for him to believe that they are as common in this section of the country as in the material which Dr. Bulkley has shown tonight. Dr. Bell said he usually chose three levels in the appendix for sections. He believed the basis of appendicitis is well established; that anything which denudes the mucosa is liable to cause infection, so it is easy to see how these worms can give rise to appendicitis. He had seen appendices postmortem with worms in them that had not caused symptoms. Pathologists in general have not felt that parasites are the cause of appendicitis. They do not know what starts the inflammation but the bacteria of the intestinal tract are about the only bacteria that are found in the pus. Something happens that opens a passage into the mucosa and anything that can do that can cause appendicitis, but no one has offered any explanation as to just what the thing is that starts it. Efforts have been made by some to connect it with sore throat, gallbladder, etc., but so far none of that work is convincing. Dr. Bell stated that it might well be that these parasites which Dr. Bulkley has shown play a much more important role than has yet been credited to them.

Dr. Bulkley added that there is another phase of the subject of parasitic infestation of the appendix which although it does not bear on the etiology of appendicitis does nevertheless possibly throw some light as to why clinically oxyuris and trichocephalis infestation of the intestinal tract is so difficult to cure. In practically all of the examinations made in connection with the work just mentioned there was found in the lumen of the appendix both sexes of the infesting parasite. As far as is known, neither cathartics, anthelmintics nor rectal medication have any effect toward emptying or washing out the inside of the appendix. It is not improbable that these parasites breed within the appendix and that it is for this reason that the medical treatment designed to eliminate them is so often a failure. Dr. Bulkley cited an instance of a woman in the fifties who since childhood had been known to have infestation with the oxyuris and who never at any time had had symptoms referable to her appendix. This patient because of distressing itching about the anus had repeatedly throughout her life made serious attempts under medical supervision to rid herself of these worms but without success. Dr. Bulkley removed this woman's appendix with the sole object of clearing up this woman's infestation. The appendix itself was normal but was found to contain parasites of both sexes. This woman received no further treatment whatsoever designed to eliminate her parasites; nevertheless her anal itching ceased and repeated stool examinations over a period of two years failed to again show parasites or their ova. This case was previously reported in the Annals of Surgery in 1912.

Dr. J. F. Corbett felt there were many phases of this discussion. He said he realized how serious it sometimes is to slip up on a diagnosis of appendicitis, and recalled a colleague who had what seemed like a very mild attack of appendicitis, although Dr. Corbett himself did not feel that it was. The next attack was

a fulminating one and the man almost died. He felt that surgeons should not lean too far back in their diagnoses. Some points which Dr. Bell mentioned, *i.e.*, the danger of lawsuits and the unscrupulous surgeons operating unnecessarily, are two things which should be kept in mind. Dr. Corbett asked the members for a full discussion of this interesting paper and Dr. Bulkley's report.

Dr. F. A. Olson said he wished to congratulate Dr. Peterson on the completion and presentation of this very fine piece of work. He also wished to congratulate Dr. Bell, who had suggested and stimulated the research.

Dr. Olson believed the investigation has added a very valuable and definite clinical entity, *i.e.*, "chronic recurring appendicitis." At no time during the clinical development of this syndrome is a definite acute exacerbation seen, but, as the title implies, the disease presents with chronically recurring symptoms and pathological changes as regards the appendix.

Up to date, the diagnosis and classification of chronic appendicitis has not been so uniform and clear-cut in its differentiation in the various medical centers and clinics. It would seem, Dr. Olson went on to say, that a more universal appreciation of the facts that Dr. Peterson has brought out in this excellent paper would clear up many differential diagnoses. Particularly would this be true in the large number of patients with gastrointestinal complaints, often indeterminate and bizarre, where a definite organic basis is difficult to diagnosticate.

Dr. Olson said he would like to ask Dr. Bell and Dr. Peterson under what classification they would put an appendix which is apparently normal in appearance when it is removed between attacks of appendicitis.

Dr. Peterson said he felt that Dr. Bell could answer some of these questions better than he could.

Dr. Bell stated, in reply to Dr. Olson's question, that after an attack of acute appendicitis, whether mild or severe, there is a period of healing which lasts a variable length of time depending upon the severity of the attack. If the appendix is taken out in that interval it shows some lymphocytes in the serous layer. During a second acute attack which may follow there will be be evidence of both the old and the recent attack. The stage of healing is the "interval appendix." In the course of time the healing goes on until there is nothing left. One can't say that the patient never had appendicitis but one can say there is no appendicitis at that particular time. There isn't anything known to the pathologist that is chronic in the sense of a low-grade infection. There are acute exacerbations. Everyone knows that appendices heal. The appendix which has an obliterated lumen is found in nearly half the adults and in many people who have never had any symptoms. It is found postmortem. And the fact that the patient gets well after the operation does not mean that the operation cured the patient. It might have been some other phase of hospital treatment, diet, etc. And some of the cases which had a normal appendix did not get rid of their trouble. Dr. Bell said that none of the men in their discussions had told him what the pathologists should put on the hospital charts in some of these cases.

Dr. Corbett said he could not help but feel that judgment must come in where arbitrary rule leaves off, and the pathological department should exercise discriminating powers. The unprincipled man should be brought to light but careful conscientious surgeons sometimes remove a normal looking appendix and care should be exercised that such cases were not made to serve the ends of the shyster lawer. The only chronic appendicitis he could recall was one that had a pin sticking through it. In addition an appendix, once the site of rupture and an abscess, proved normal on examination when it was removed six months later.

Dr. J. A. Johnson said he could not see that there is anything to hide in these cases. Why not be perfectly frank in regard to the appendix? Why not call them "inactive appendicitis," for that is what they really are?

Dr. S. R. Maxeiner was of the opinion that Dr. Bell's statement, "No acute inflammation to be found at this time," covers the situation very well. No one could tell definitely what had taken place before that.

After the scientific program, a short business meeting was conducted. The President called upon the Secretary to read the minutes of the October meeting, and these were approved as read. The Secretary reported that the Council had already approved the application of Dr. H. M. Lee and his name should be voted upon at this meeting.

Upon ballot, Dr. Lee was unanimously elected to membership in the Society.

The President reported that the matter of a new lantern had been investigated further, and it was decided to continue using the small lantern for ordinary slides and the one in the auditorium for microscopic slides when necessary.

The meeting adjourned, after the President called upon the members to send in the titles of interesting case reports so that the programs for future meetings might be arranged satisfactorily.

H. O. McPheeters, M.D., *Secretary.*

THE ABSORPTION OF LEVULOSE

Various investigators have asserted that levulose is particularly valuable in the dietary of patients with diabetes. Perhaps the most enthusiastic report, among the conflicting statements, is that of Joslin, who is inclined to believe that levulose can be used with advantage in the diabetic diet in small amounts daily for intermittent periods. Levulose seems to cause a different type of metabolism from dextrose, possibly because of the conversion of levulose in part into fat in diabetes or to a more active stimulation of the production of insulin. A recent investigation has shown that levulose is not changed to dextrose in the intestines. Whatever transformations occur take place beyond the seat of absorption. (Jour. A. M. A., October 24, 1931, p. 1230.)

PROGRESS

Abstracts to be submitted to Section Supervisors.

Members are urged to abstract valuable articles which they run across in their reading and send the abstracts to the physicians in charge of the respective sections. In order to avoid duplication it would be well to communicate with one of the section supervisors before the article is abstracted.

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EYE, EAR, NOSE AND THROAT

THE SIGNIFICANCE OF THE SQUAMOUS EPITHELIUM IN THE CAUSE AND REPAIR OF CHRONIC MIDDLE EAR DISEASE: Ralph Almour (Trans. Amer. Acad. of Ophthalm. and Otolaryng., 1930, pages 357-377). According to Wittmaack the normal process of pneumatization consists of three stages: first, the ingrowth of subepithelial connective tissue into the marrow spaces; second, the contraction of the subepithelial tissue; and third, the sinking in of the epithelial covering.

The catarrhal type of infantile otitis results when meconium or any other foreign body finds its way into the middle ear during the early stages of respiration. A foreign body irritation occurs producing localized destruction of areas of the epithelium in the middle ear and later hyperplasia of connective tissue. Thus the process of pneumatization ceases at the end of the first stage. A metaplastic bone formation occurs resulting in what we call a sclerotic mastoid process.

If suppuration occurs, the type of mastoidal structure found will depend upon what stage of pneumatization had developed within the mastoid at the time of the onset of infantile suppuration. If suppuration sets in before the first stage, a mastoid will be developed with its spaces filled with marrow, and it is termed diploetic. If suppuration occurs in the first stage, a partially pneumatized mastoid process results.

The development of chronic suppurative otitis media depends on what degree of pneumatization has occurred in the mastoid. An individual with a normally developed mastoid will develop an acute mastoiditis from a suppurative middle ear condition rather than a chronic aural suppuration. An individual with a faulty pneumatization of the mastoid cannot develop an acute mastoiditis. In this case the aural suppuration will produce an acute otitis media which will heal or produce a chronic suppuration of one form or another.

There are two types of chronic otorrhea—tympanic mucosal suppurations and suppurations kept up by the ingrowth of squamous epithelium. The type of mucous membrane remaining after the catarrhal type of otitis media neonatorum is a hyperplastic mucosa. The tendency for an acute suppurative otitis to develop into a chronic purulent otitis of the catarrhal type depends upon the degree of hyperplastic mucosa present as a result of infantile otitis of the catarrhal variety. This type is always associated with a large persistent central perforation of the drum. The squamous epithelium grows through the perforation from the outer to the inner surface of the drum. The mucosal epithelium, being higher at the periphery, resists the ingrowth of squamous epithelium here. When the ingrowth of squamous epithelium is stopped, the size and shape of the perforation does not develop any further.

The second type of chronic otorrhea is dependent upon the ingrowth of squamous epithelium into the middle ear and its adjoining spaces. This type also depends on the previous occurrence of an infantile catarrhal otitis. For the development of this type adhesive bands must be present. These afford easy access of epithelium into the middle ear. As the epithelium grows into the middle ear it replaces the mucosal epithelium. Where the two kinds of epithelium meet, there appear to be granulations. The squamous epithelium undergoes its normal process of desquamation and these products act as an irritant to the mucosal epithelium. This produces a chronic inflammation of the mucosa which in turn acts on the squamous epithelium, producing a condition similar to eczema. Usually the ingrowth of squamous tissue continues until the entire middle ear is covered with it.

Squamous epithelium also takes part in the production of a cholesteatoma. The middle ear and accessory spaces are completely filled with the products of epithelial desquamation. These are not thrown off but accumulate and cause a definite increase in the size of the spaces.

A cholesteatoma may be primary or secondary. If

primary, it is formed without inflammation. It usually occurs from mechanical causes. The adhesive bands which are present in the middle ear may separate the aditus and antrum from the tympanum. The air is absorbed in the walled off aditus and antrum, Shrapnell's area of the drum is subjected to negative pressure, a transudate occurs in the middle ear, Shrapnell's membrane recedes until it reaches the walls of the antral space, it becomes adhered here and finally ruptures from the negative pressure. The squamous epithelium then rapidly proliferates into the aditus and antrum, the products accumulate and a cholesteatoma forms.

Another form of chronic purulent otitis media due to the catarrhal type of otitis media neonatorum is that which occurs in scarlet fever and in connection with debilitating diseases like diabetes or nephritis. It is produced by a widespread thrombosis of the vessels of the submucosa leading to a mass necrosis of the mucous membrane. In severe cases the periosteum becomes involved. If all the mucosa is not destroyed, healing may occur from regeneration of the remaining mucosa. In cases where the mucosa is entirely destroyed, healing occurs through the ingrowth of squamous epithelium. If the antral lumen is retained as such, the epithelium grows into it and forms a secondary cholesteatoma.

JAMES BRUSEGARD, M.D.

GYNECOLOGY AND OBSTETRICS

GUM ACACIA IN THE TREATMENT OF ECLAMPSIA: William J. Dieckmann (Am. Jour. Obst. & Gynec., Vol. XXII, No. 3). The author postulates that in eclampsia there is an absolute or a relative decrease in blood volume with abnormal concentration. This explains many of the chemical changes described by various investigators. The faulty circulation leads to "tissue acidosis" and accumulation of waste products. The concentrated blood has a short coagulation time, predisposing to intravascular thrombosis and to the pathological lesions characteristic of eclampsia.

It is generally accepted that during normal pregnancy there is a true hydremia which may be accentuated in pre-eclamptic conditions. During eclampsia there is a concentration similar to that seen in shock and burns. The condition requires a form of treatment which will replace water in the circulation and retain it there. The use of glucose solution intravenously is usually effective and leads to clinical improvement. In certain cases, however, the dilution could not be maintained. For these, blood transfusion is not advisable because of the already high hemoglobin, cellular content, and viscosity. On theoretical grounds the author believed that gum acacia solution would serve to accomplish this purpose.

His clinical experience with a small number of cases confirms this idea. He advises the use of from 500 to 1,000 c.c. of a 6 per cent solution of acacia prepared by Eli Lilly & Co.

He concludes: The principal change in the blood in eclampsia is a concentration which may be absolute or relative. Relief of this condition is usually accompanied by clinical improvement. Hypertonic glucose has previously given the best results in relieving this condition.

Gum acacia solution has cured patients who did not respond satisfactorily to our usual methods of treatment. The probable explanation is that an injection of the gum acacia solution increases the blood volume, lowers the viscosity and thereby improves the circulation through the tissues.

A. L. MCDONALD, M.D.

EPINEPHRIN IN THE TREATMENT OF THE DYSTOCIA OF DEMELIN (Spastic contraction of the uterus): Pierce Rucker (Gynecologie et Obstetrique, Vol. XXII, No. 5). The author reviews experiments conducted upon the uterus during labor showing the effects of epinephrin 0.3 c.c. of a 1 to 1,000 solution given hypodermically, resulting in a definite and constant arrest of uterine contraction for a period of from nine to thirty minutes. These findings have been confirmed by other independent investigators.

The action of epinephrin upon the uterus during pregnancy and labor has the following applications.

1. To prevent abortion or premature labor. The use of 0.3 c.c. of a 1 to 1,000 solution of epinephrin has proven more efficacious than morphine or atropine.

2. To overcome the effect of uterine hypertonus or contracture in prolonged labor. The same medication gives satisfactory rest and relaxation, after which labor proceeds normally.

3. In cases of prolonged labor complicated by annular contracture, the so-called "Bandl's Contraction Ring," hypodermic injection of 0.5 c.c. of a 1 to 1,000 solution of epinephrin was followed by a period of relaxation greater than that produced by anesthesia alone, and sufficiently prolonged to permit of surgical delivery by version or forceps.

A. L. MCDONALD, M.D.

MEDICINE

A STUDY OF FIVE HUNDRED DIABETICS: Elmer L. Sevringhaus, M.D. (Amer. Jour. of Med. Sci., September, 1931). This article is of considerable interest to the practitioner who is treating diabetics. This is a study of five hundred cases which were admitted to the Wisconsin General Hospital. These cases came from rural districts.

Of these five hundred cases, 60 per cent required insulin on discharge.

Pulmonary tuberculosis, which has been said to occur in about 4 per cent of diabetics, was found in only about 2 per cent of this series. This may be explained in the fact that these patients came from rural districts.

Pain in the extremities, which is a rather frequent complication of diabetes, occurred in 36 per cent of this

series. As a therapeutic measure they recommend alternate warm and cold applications, but they recommend highly the use of the Buerger passive exercises for the legs, which has given real symptomatic help in many instances. However, the relief from pain does not become evident until the exercises have been used for three or four weeks. Leg pains in the second and third decades are commonly of the cramp type, and are promptly relieved when diabetic therapy is adequate.

The causes of death include sepsis, cardiovascular-renal disease, and coma, in the order of importance. Pyogenic infection after gangrene, and pneumonia, are the commonest infective processes leading to death. The significance of cardiovascular-renal disease in the diabetic is discussed, and is of such a common occurrence that it should receive more consideration than it usually does.

The occurrence of ketosis at the time of admission, or first examination, is shown to be a good evidence of the need of insulin. This, again, is a practical point worth keeping in mind.

RICHARD BARDON, M.D.

PNEUMOPERITONEUM IN THE TREATMENT OF TUBERCULOSIS: Andrew L. Banyai, M.D., Muirdale Sanatorium, Wauwatosa, Wis. (Amer. Jour. Med. Sci., Sept., 1931). The author in a résumé of tuberculous enterocolitis emphasizes the frequency of tuberculous ulceration (60 to 90 per cent) in autopsies. Steinbach noted 61.5 per cent of 127 positive autopsy findings in which the condition had not been recognized during life from absence of physical signs. Attention should be paid to all forms of gastro-intestinal distress and of *nervous irritability* and the fact the patient is not doing well. Diarrhea is not characteristic of ulceration of the large intestine. Rigidity of the abdominal wall is indicative of disease of the serosa.

While it is possible to establish a diagnosis upon these symptoms and physical findings, alone, the X-ray should corroborate all cases. The Stierlin sign—a filled terminal ileum and filling-defect in cecum and ascending colon—receives due emphasis. Diagnosis may still fail in some cases because of the absence of subjective signs, and of the unreliability of roentgenologic findings. Therapeutic pessimism is not justifiable because healed ulcerations are noted clinically and by postmortem examination.

The cure is dependent partly upon early diagnosis. "The only proper method is to anticipate symptoms" (Stewart). The treatment should be (1) prophylactic, (2) dietetic, (3) medicinal, (4) radiational, (5) surgical, (6) pneumoperitoneal. The prophylactic treatment includes HCl to prevent anacidity. The diet should be small in bulk, cellulose-free, of easily-assimilable foods, of smooth consistency. Liquid foods are required when there is much diarrhea. Entirely salt-free diet is badly borne.

The medical treatment includes calcium intravenously, and bismuth, astringents, atropine and opium. Radiation by natural and artificial sunlight yielded 85 per cent symptom-free after six months' treatment.

Early exploratory laparotomy is used only in mildly active or quiescent pulmonary disease without marked gross anomalies, on constitutional symptoms, also in cases in which the roentgen findings and physical signs indicate a well localized lesion of cecum or ileum occurring late in chronic or intermittent types of pulmonary diseases.

Pneumoperitoneum with oxygen was used by Banyai in 44 per cent of his cases. Time: between breakfast and lunch. The bladder was emptied before operation. Enemas and cathartics avoided. Codein was given for cough. Site of entry—three fingerbreadths below and left of umbilicus. Anesthetic 1 per cent novocain. A small skin-incision admitted the Floyd-Robinson needle, which was slanted upwards towards the mid-line. Manometer readings are made as in pneumothorax, but are not of as great value as in the thorax. The intra-abdominal pressure is neutral in untreated cases. The operator judges chiefly by the lack of resistance when the needle enters the peritoneal cavity. Positive pressure occurs usually after 300 to 500 c.c. of oxygen. The disappearance of dullness and the subjective impressions of the patient are useful guides. Absence of liver dullness follows full doses. From 300 to 1,200 c.c. are used. The largest amount injected was 1,500 c.c. The smallest 150 c.c. There may be discomfort due to tension. The patient is usually allowed to walk back to his room and the daily routine is not changed except when there is discomfort from over-tension. Under-inflation rather than over-inflation is desirable. The mechanical effect of oxygen upon the lesions is not exactly known. Oxygen increases all cell-activity. It is known to cause irritation of the peritoneum and serous larger of the intestinal wall. A decrease in peristalsis was noted. The ideal includes maximum immobilization, improved nutrition, immune-body supply, stimulation of phagocytosis and the neutralization of toxic products. The essayist used the procedure only in those cases which did not show a satisfactory response to dietetic and medicinal treatment. Symptomatic relief was shown in 70.4 per cent. Complete relief was seen in 31.8 per cent. No relief in 29.6 per cent. The results were considered sufficiently encouraging to warrant a more frequent use of the method.

J. G. LAMONT, M.D.

PEDIATRICS

TREATMENT OF WHOOPING-COUGH WITH CONVALESCENT SERUM: J. C. S. Battley, M.B. (Tor.), Port Huron, Mich. (Arch. Ped., Vol. XLVIII, No. 10, October, 1931). Forty infants, who undoubtedly had been exposed to others suffering from whooping-cough, were given two to three c.c. of pooled serum taken during the fourth week of illness, at which time it had been found that the antibody content of the serum was highest, as shown by complement fixation tests. Of these patients, thirty-one were entirely protected, six had a mild illness, and three had the usual attack. Debre concluded that if the serum is injected before the end of the incubation period the onset of illness is prevented, if at the end of the incubation

period the disease appears in mild form, if during the invasion period it is not affected. Gillot gave whole blood subcutaneously, taken from persons who had had whooping-cough a long time before, in a series of children from one month to six years of age. He found that four children injected before the catarrhal stage began were completely protected and two injected during the catarrhal stage suffered from a mild attack. In another series, blood of fathers and mothers without a history of whooping-cough was used. Six children injected before the catarrhal stage escaped the disease and five injected during the catarrhal stage had a mild attack. Doses of two to four c.c. of blood were used, the larger for the older children.

Convincing evidence of the value of convalescent serum must await extensive observation. Meanwhile, convalescent serum or convalescent whole blood, or even the blood of persons who have had whooping-cough in childhood, should be worthy of trial for prevention and treatment.

R. N. Andrews, M.D.

ROENTGENOLOGY

THEODOR BARSONY AND ERNST KOPPENSTEIN: CONCERNING THE SHADOWS IN THE UPPER LUNG-FIELD (Fort. a. d. Geb. der Roentgenstrahlen, September, 1931, 44:320). The authors discuss the appearance and significance of certain little known or confusing shadows in the upper lung fields. The "companion-shadow of the second rib" (of Albers-Schönberg), the "lateral companion-shadow," and the "medial curved shadow" (now described for the first time) are all normal manifestations but are of importance as they occur in regions susceptible to pathological changes. Each is illustrated and discussed in detail. Figures are given for the frequency of the occurrence of each in roentgenograms of 200 lung apices.

A triangular shadow with its broad base lying against the chest wall may occasionally represent the upper end of an atypically placed main interlobar fissure.

At the medial angle of the scapula is a round soft tissue shadow which represents the attachment of the upper portion of the serratus anterior muscle.

The shadow of a deep-seated groove for the clavicle may be mistaken for a cavity, while the summation shadow of the sterno-cleido-mastoid and the first rib may simulate an adhesion.

Frederick B. Exner, M.D.

MEDIASTINAL TUMORS AND THEIR COMPARATIVE SENSITIVITY TO IRRADIATION: S. Lamarque and J. M. Bert (Jour. de Radiology et Electrology, August, 1931, XV, No. 8, pp. 416-26). The authors have seen two cases of mediastinal tumor recede under X-ray therapy and compare the response to treatment in the two cases according to sensitivity. The first case was a girl of fourteen years who had a mediastinal lymphocytoma that completely disappeared in eight months under X-ray therapy and had not recurred after two and one-half years. The second case is a man of twenty-seven years who had a lymphogranulomatosis (Hodgkin's disease) that disappeared after one year of X-ray therapy and had not recurred after nineteen months.

Mediastinal tumors may be divided into lymphoid and non-lymphoid types. The lymphoid tumors may occur with or without blood changes, and the response to X-ray therapy is good although the ultimate prognosis is bad because of recurrences. The response to therapy is not as good in Hodgkin's disease and the prognosis is poor because of local and general recurrences. Treatment is most effective in the early stages of the disease.

They conclude that histology is the most important factor in treatment. Mediastinal tumors can be classified according to their response to therapy as well as their histologic structure. This constitutes a therapeutic test and the response varies with the type of tumor. Clinical and experimental work has shown good response in lymphoid and hematopoietic organs. X-ray today is the most powerful, curative or palliative treatment of mediastinal tumors although its results are usually temporary.

Jacob Sagel, M.D.

SURGERY

SPLENECTOMY—ITS INDICATIONS AND TECHNIC: David P. D. Wilkie, F.R.C.S., Edinburgh (Amer. Jour. Surg., Vol. XIV, No. 1, October, 1931). This article, which reviews briefly the indications for splenectomy in cases of splenomegaly associated with definite blood changes, is especially interesting for the definite and detailed description of the operative technic, with illustrations. The three blood dyscrasias in which splenectomy is done are briefly described, including splenic anemia, hemolytic jaundice, and chronic purpura. Cases exemplifying each type are reported.

The description of the operation itself is unusually clear, so that it is herewith abstracted verbatim:

"In textbooks of operative surgery no operation is described so inadequately as splenectomy. Whether the spleen be normal in size or grossly enlarged there are certain points in anatomy which must be appreciated if its surgical removal is to be rendered easy and safe. The organ lies very deeply in the left hypochondrium and is maintained in position by the lienorenal ligament up the medial border of which run the splenic vessels. The outer leaf of this ligament is short and in splenomegaly is often thickened. It forms an effective barrier to delivery of the spleen into the wound and it must be divided as a definite step in the operation before any attempt is made to deal with the splenic pedicle. In order to expose the front of this pedicle the gastrosplenic omentum must be divided, the vasa brevia being ligated, and, that ready access to the

pedicle in case of mishap may be insured, this should be the first step of the operation. The gastrosplenic omentum is very short at the upper pole of the spleen and care must here be exercised in ligating. It is of advantage to leave this short uppermost portion till a later stage in the operation when complete mobility of the spleen has been secured. That the stomach may not impede the view of the splenic pedicle it is a good practice to pass a stomach tube and leave it *in situ* during the early stages of the operation.

"Now comes the most important step in the operation. A hand is placed over the phrenic surface of the spleen and the organ is gently pulled over to the right. At the same time, the left costal margin is retracted and the outer leaf of the lienorenal ligament, which has been rendered tense, is exposed. With a long-handled knife the peritoneum of the ligament is divided and the spleen comes forward. With a second touch of the knife the thickened subperitoneal areolar tissue or fascia propria is divided and the spleen completely mobilized. No difficulty is now encountered in delivering the spleen in the abdominal wound. The upper end of the gastrosplenic omentum is now readily accessible and the very short vessels running from the stomach to the upper part of the splenic hilum are ligated and divided.

"The main splenic pedicle is now raised on two fingers of the left hand. The splenic artery which lies uppermost is freed, doubly ligated and divided. After a pause to allow of venous drainage and thus minimize loss of blood, the splenic vein is similarly dealt with. The tail of the pancreas can now be dissected off and the spleen removed. There should be no hemorrhage.

"Summarized the steps of the operation are as follows:

1. Anesthesia.
2. Passage of stomach tube.
3. Left paramedian incision.
4. Ligation and division of the gastrosplenic omentum.
5. Spleen gently pulled to right and with a long knife the peritoneum forming the outer leaf of the lienorenal ligament divided. The underlying fascia propria is also divided.
6. Spleen delivered in wound and extreme upper end of gastrosplenic omentum divided between ligatures.
7. Pedicle raised on fingers.
8. Splenic artery doubly ligated and divided.
9. Splenic vein doubly ligated and divided.
10. Tail of pancreas dissected off.

"There is no abdonimal operation in which a deliberate plan, based on antomical knowledge, is more essential than in splenectomy. In dealing even with the largest spleen, hemorrhage need not occur if such a plan be followed, and what some have called adhesions are, I believe, merely anatomical attachments thickened to support the weight of the enlarged organ. Speed is of no importance in the bad risk splenectomy; infinite care to preclude the possibility of hemorrhage is all-important."

A. E. Sohmer, M.D.

BOOK REVIEWS

Books listed here become the property of the Ramsey and Hennepin County Medical libraries when reviewed. Members, however, are urged to write reviews of any or every recent book which may be of interest to physicians.

Certified Milk. Conference held in 1931. 334 pages. Brooklyn, N. Y.: American Association of Medical Milk Commissions, Inc., 1931.

The Human Voice. Its Care and Development. Dr. Leon Felderman. 301 pages. Illus. Price, $2.50. New York: Henry Holt & Co., 1931.

Health Protection for the Preschool Child. (The White House Conference.) 275 pages. Price, $2.50. New York City: The Century Company, 1931.

Conquering Arthritis. H. M. Margolis, M.D. 192 pages. Illus. New York: The MacMilan Company, 1931.

Vertebrate Zoology. Casey A. Wood, M.D., LL.D., Collaborator, Division of Birds, Smithsonian Institution. 643 pages. Illus. Price, $15.00. London: Oxford University Press, 1931.

A Doctor of the 1870's and 80's. William Allen Pusey, A.M., M.D., LL.D. Sometime President of the American Medical Association and the American Dermatological Association. 153 pages. Illus. Price, $3.00. Springfield, Ill.: Charles C. Thomas, 1932.

A Non-Surgical Consideration of Prostatic Enlargement. Edwin W. Hirsch, M.D. Associate in Urology, College of Medicine, University of Illinois, Urologist, Englewood Hospital, Chicago. 79 pages. Illus. Price, $2.00. Saint Paul, Minnesota: Bruce Publishing Company, 1931.

AN INTRODUCTION TO THE LITERATURE OF VERTEBRATE ZOOLOGY. Based chiefly on the titles in the Blacker Library of Zoology, the Emma Shearer Wood Library of Ornithology, the Bibliotheca Osleriana (the Gest Library of Chinese Literature), and other Libraries of McGill University, Montreal, Canada. Compiled and edited by Casey A. Wood, M.D., LL.D., Collaborator, Division of Birds, Smithsonian Institution. 4to, pp. xix and 643. Col. frontispiece, $15.00 (3 guineas). London: Oxford University Press, 1931.

In an Introduction to the Literature of Vertebrate Zoology, Dr. Wood has written nineteen chapters or about 149 quarto pages in his characteristic and entertaining way from the beginnings of zoological records from early Greek and Oriental zoologists down to the present day. For those who read these chapters, will be found an enormous amount of painstakingly acquired information on all phases of Vertebrate Zoology, and written in a pleasing style which takes on a personal interest for those who know Dr. Wood.

This introduction gives a review and comments on

the books, periodicals, and manuscripts contained in the Libraries of McGill University. Their files are replete with rare and important writings in vertebrate zoology and especially in ornithological literature.

This catalogue is indexed under general treatises on vertebrate zoology of the world, subdivided under birds, mammals, fishes, and reptiles and batrachians. This is followed by an index, a geographical catalog under continents, countries, and island groups. The main part of the work follows in 469 quarto pages of alphabetically arranged authors' and periodical titles in the McGill University Libraries. There are throughout the catalog under-titles, comments and résumés by the author which make this work a most valuable catalog for anyone interested in the literature of vertebrate zoology.

JOHN C. BROWN.

CONQUERING ARTHRITIS. H. M. Margolis, M.D. 192 pages. Illus. New York: The Macmillan Company, 1931.

On the whole the field for books on disease written for the patient is limited. One is inclined to be rather antagonistic at first to the idea of a book written by a doctor for the arthritic patient. This volume, however, gives the essentials of the present status of medical knowledge about the cause, classification and treatment of arthritis, as well, at least, as can be given on a subject about which medical knowledge is so woefully incomplete. A chronic arthritic patient is so likely to become discouraged and resort to perfectly useless and costly methods, grasping at a straw for some cure, that it seem very probable that this volume will meet a real need.

C. B. DRAKE, M.D.

THE INTERNATIONAL MEDICAL ANNUAL. Wm. Wood & Co., New York. Price, $6.00.

The 1931 volume of this annual is the forty-ninth of the series. The British editors and contributors have again succeeded in including in this fair sized volume a summary of the progress made in the entire field of medicine and surgery with the exception of pathology. The sources have been international.

Recent work or undulant fever, iodine compounds for intravenous urography, hyperinsulinism, sympathectomy are typical inclusions.

The book is not too large for a complete reading, and solves in part the impracticability of keeping up with the mass of modern medical literature. It should be of particular value to the general practitioner.

C. B. DRAKE, M.D.

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